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**Regulation 25
Town and Country Planning
(Environmental Impact Assessment) Regulations 2017
Request for Further Information**

**Noise & Vibration Impact Assessment for
Proposed Sand & Gravel Quarry
at**

**Land at Bow Farm
Bow Lane
Twyning
Tewkesbury
Gloucestershire**

for

M.C. Cullimore (Gravels) Ltd

Application Number: 19/0081/TWMAJM (District Ref: 19/1231/CM)

Undertaken by:

Noise & Vibration Consultants Ltd

**Member of Institute of Acoustics
Member of Association of Noise Consultants
Member of Academy of Experts**

Consultant: D.R. Kettlewell MSc MIOA MAE I.Eng

Report No.: R18.1004/Reg25/DRK

**Report prepared by:
D R Kettlewell MSc MIOA MAE I.Eng – Principal Consultant:**



Date: 22nd July 2020

Further Information Request under Regulation 25 of the Town & Country Planning (Environmental Impact Assessment) Regulations 2017:

Responses:

Noise and Vibration

Gloucestershire County Council & Worcestershire County Council

Q1. Further information is requested in relation to vibration and the impacts upon sensitive receptors, and in particular the impact of vibration upon the heritage asset of Puck Cottage (Grade II Listed Building).

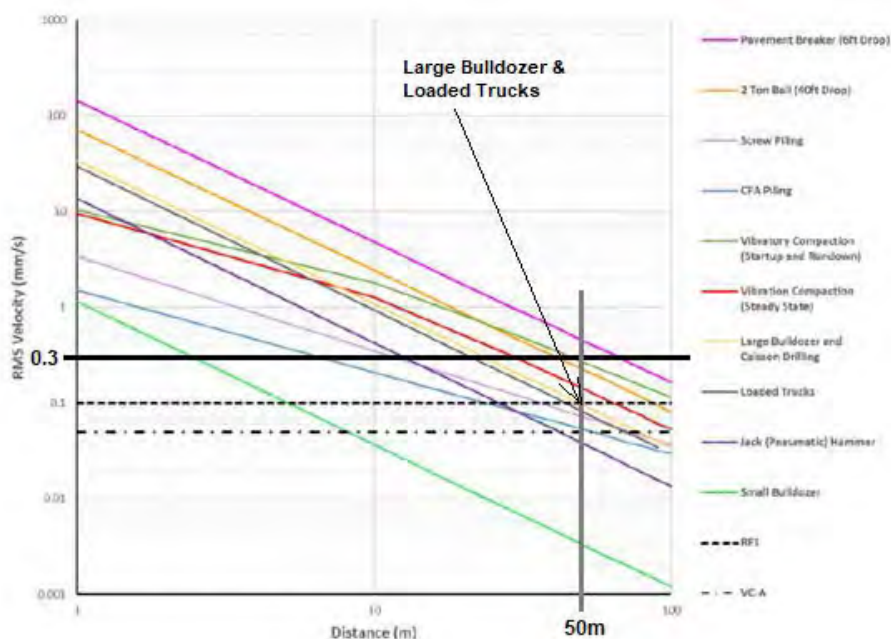
Response Q1.

The NVC Noise & Vibration Assessment (report ref. R18.1004/DRK dated 5th November 2018) provides details on the guidance and standards relating to Ground Vibration (i.e. section 4.3) and Table 4.6 of the report sets out the semantic impact magnitude scale for operational vibration.

Furthermore, section 6.5.10 to 6.5.17 of the report provides the assessment of effects from vibration relating to mobile plant and HGV generated vibration.

Appendix NVC/10 provides additional information in respect of research and studies undertaken on the typical levels from bulldozers, loaded trucks and the movement of HGVs on roads.

The closest approach to Puck Cottage (i.e. during the construction of earth mound screening) is circa 50m (this being the closest of all receptors). The following graph provides additional information on vibration levels from this source of vibration. The 50m distance and the perceptible level of vibration (0.3mm/sec PPV) is indicated on the graph (as black & grey solid lines). The level of vibration for a large bulldozer (light orange thin line) and loaded trucks (thin grey line) is shown to be circa 0.1mm/sec. This is below the level of perceptibility and therefore insignificant and a **negligible** impact magnitude and **neutral** effect on the property.



The evidence shows that plant used on site with the maximum likely generated ground vibration, does not produce any significant levels of vibration. For any cosmetic damage to occur this would mean that vibration levels would need to reach levels of around 5mm/sec and maximum levels predicted are insignificant.

Bow Farm property (owned by the applicant) is circa 25-30m from the nearest mobile plant activity and during earth mound screening works, the predicted maximum vibration levels are shown to be just below 0.3mm/sec, which again is insignificant.

Q2. *Whilst figures are provided on vibration levels emitted from plant, none appears to be correlated to the potential effects on the nearest sensitive receptors. Please justify / clarify or update accordingly.*

Response Q2.

As detailed above, the maximum vibration levels would be produced at the minimum separation distance from the source to receiver (i.e. Puck Cottage). If the levels of vibration are acceptable at the closest approach to a residential property, then at greater distance the vibration level is highly likely to be lower. There is therefore no need to correlate to other receptors on this basis as the impact at the closest approach is already shown to be negligible.

Q3. *In accordance with Worcestershire Regulatory Services comments, dated 11 December 2019 and 7 February 2020 the applicant should respond to the following concerns from third parties in relation to noise impacts and the adequacy of the Noise Assessment, namely:*

- **Q3a:** *In the Hydrological report it is stated that the site will not be dewatered. Within the list of process plant there is a de-watering pump. Please justify / clarify or update accordingly.*

Response Q3a.

Each phase will not need to be dewatered and will be worked dry. There will be however a clay cut-off drain intercepting groundwater and routing it around the perimeter of the site. A pump will be required infrequently to remove rainwater.

- **Q3b:** *With regards to sensitive receptors there is no mention of, nor calculations undertaken, for the golf course at Puckrup Hall. Please justify/clarify or update accordingly.*

Response Q3b.

Puckrup Hall is covered in the assessment of noise at position 5 of the assessment. Spot roaming measurements of typical background levels were taken at position G (near entrance to Puckrup Hall). Additionally, fixed monitoring positions at B and C and F are positions which are indicative of levels around the golf course area. The lowest measured background level of 43dB LA90 (i.e. 53dB LAeq_{1hr} noise limit) has been used for the assessment of impact at this receptor and is detailed in Tables 6.1 to 6.6 of the report (Receptor 5).

- **Q3c:** *No distances are quoted to the amenity areas of sensitive receptors, having particular regard for those properties to the east of the site. Please justify / clarify or update accordingly.*

Response Q3c.

| Receptors | Approximate Distance to mineral workings (m) | Approximate Distance to processing area (m) | Direction relative to extract areas |
|---|---|--|--|
| 1. Silvermead | 440-1680 | 1740-1950 | North & Northeast |
| 2. Bow Farm (owned by applicant) | On Site | 520-710 | Central & Northwest |
| 3. Puck Cottage, Bow Cottage, Bowfields, Threshing Bow, The Bow | 50-1180 | 700-930 | East & Northwest |
| 4. Bow Bridge Cottage, Scarecrow Stables, Dadsley Cottage | 180-1100 | 400-600 | East & Northwest |
| 5. Puckrup Lane (Puckrup Hall) | 650-1400 | 300-750 | East & Northeast |
| 6. Fairfield Bungalow (owned by applicant) | 860-1730 | 240-700 | East |
| 7. Twyning Farm, Owls End | 750-1830 | 240-500 | Southeast & South |
| 8. Redpools Farm | 700-1900 | 400-720 | South & Southwest |
| 9. Windmill Tump & Bushley Green | 620-1730 | 1350-1780 | Southwest |
| 10. The Stalls, Bredon School & Church End Farm | 640-1450 | 1700-2000 | West |

- **Q3d:** *In terms of cumulative values it is not possible to ascertain whether the bunds and soil stripping can be carried out as a single operation. If such an operation is as shown on the Phase 1 plans, then please state how this would be achieved across the site in less than 8 weeks. If this is not the case then the noise values should be amended to show noise levels from temporary activities as well as to the normal operation of the site. Please justify / clarify or update accordingly.*

Response Q3d.

The working method, as is typical of sand and gravel sites, that the soil is stripped at the start of the development. This will then be either stored or used to construct earth mound screens on site. Under the provisions of relevant guidance (i.e. Planning Practice Guidance (PPG) 'Guidance on the planning for mineral extraction in plan making and the application process' this is classed as a short-term noisy activity (as described in section 4.2 of the report) and the higher temporary noise limit is applicable. The noise model predictions allow for the cumulative effect of stripping the soil from the extraction areas and moving and placing/shaping the earth mound screens, so this has been assessed.

- **Q3e:** *Within paragraph 11(iii) of the Noise & Vibration Impact Assessment it states that:*

'noise level for the life of the site would be similar to or lower than background noise +10dB(A) or below the 55dB(A) maximum limit advised by planning guidance.' If the figure of +10dB(A) is based upon average values then it appears likely that noise levels would exceed the maximum limit 'advised by planning guidance'. Please justify / clarify or update accordingly.

Response Q3e.

It is normal practice to obtain typical background sound levels over a typical day and under appropriate monitoring conditions. In accordance with the guidance and other standards it is not appropriate to use the minimum measured LA90 level as this is not deemed to be typical or representative. For this reason, a logarithmic or arithmetic average is an appropriate approach. Having said that, if we were to use the minimum LA90 measurement from the baseline survey, then the background +10dB minimum requirement would not alter either the established maximum noise criteria or impacts. For example, at Bow Lane north [positions A & A1] the minimum LA90 measured in 2018 was shown to be 49dB and 54dB LA90_{15mins} respectively and a resultant limit of 55dB LA90_{1hr} (i.e. no change to the limits in the report).

- **Q3f:** *The Noise & Vibration Impact Assessment does not appear to be accompanied by noise data for the proposed concrete batching plant or the washing and screening plant. The MPA is of the opinion that noise data for these processes and plant equipment is required and should be appropriately assessed in the context of those sensitive receptors at the leisure hotel at Puckrup Hall and the occupiers of Far End and Church End Nursery who are in closest proximity to the proposed processing plant and equipment.*

Response Q3f.

The noise data for some of the included noise sources at the processing area for the noise mapping were not listed in the Plant Inventory within Appendix NVC/8. However, the processing plant noise prediction model used for the noise assessment includes the following noise sources, which are based on empirical data obtained with plant under load at other mineral sites in the UK and are therefore realistic and provide maximum accuracy:

Power Screen & Wash Plant: 109dB(A) sound power level (81dB(A) @ 10m)

Concrete batching plant: 105dB(A) sound power level (77dB(A) @ 10m)

Concrete Batching pump: 103dB(A) sound power level

HGV (static and mobile): 101dB(A) sound power level

Front shovel loader (mobile): 107dB(A) sound power level

Generator for wash plant: 95dB(A) sound power level (67dB(A) @ 10m)

The above assumptions on noise levels are therefore appropriate and robust.

In terms of the effect at Puckrup Hall, as previously explained this is covered under the assessment at Position 5 within Tables 6.1 to 6.6.

In relation to the Nurseries, the background sound levels in this area will be between that established at positions C and D (i.e. somewhere between 44dB to 50dB LA90). This is likely to result in a noise limit of 55dB LAeq_{1hr}. Noise prediction calculations from the established noise models indicates a noise contribution from the proposed development (i.e. mineral workings and processing) of between 47dB to 49dB LAeq_{1hr}. The noise mapping results have been updated to include this receptor. The results at this receptor show no significant impacts or effects.

- **Q3g:** *Within the Baseline Sound Survey Results, the final measurement of background noise values ceases between 2pm and 2.45pm. However, paragraph 2.7 of the Noise & Vibration Assessment states that the operating hours of facilities applicable to that assessment would operate between 07:00hrs to 18:00hrs on weekdays and from 07:00hrs to 13:00hrs on Saturdays. Please justify / clarify or update accordingly.*

Response Q3g.

The baseline survey was undertaken between 0700 to 1400/1445 hours during the survey in October 2018 on a typical day and under appropriate measurement conditions. The quietest period of the day will tend to be between these hours as it covers the early morning period and mid-morning to afternoon period (due to avoiding peak road traffic movements when the public are travelling home). This provides a robust assessment of background levels as they are in theory likely to be slightly lower, which increases the assessment of impact.

For further robustness we have undertaken a second background sound survey at the most sensitive receptor locations during a weekday period in July 2020 for the complete operating period. This was undertaken during a period when some Covid 19 restrictions were still in place in respect of certain businesses being allowed to open. This is likely to have influenced general noise from the local road network and movement along the M50 Motorway (i.e. slightly lower traffic flow) and subsequently a potential lowering of background sound levels. This data is attached in Appendix NVC/11 for reference but the comparison of background sound levels for the two surveys is presented below in Table 1.

Table 1: Baseline Sound Survey Results October 2018 & July 2020

| Location | Survey Date | Time Period | LAeq dB | Representative LA90 dB | PPG Noise Limit (General) LAeq _{1hr} dB |
|-----------------------|----------------|-------------|---------|------------------------|--|
| A) Bow Lane (N) | 10th Oct 2018 | 0700-1400 | 61 | 54 | 55 |
| A1) Bow Lane (N) | 10th July 2020 | 0700-1800 | 58 | 54 | 55 |
| B) Bow Lane (S) | 10th Oct 2018 | 0715-1415 | 52 | 44 | 54 |
| | 10th July 2020 | 0700-1800 | 51 | 44 | 54 |
| C) Fairfield Bungalow | 10th Oct 2018 | 0745-1445 | 56 | 50 | 55 |
| | 10th July 2020 | 0700-1800 | 52 | 48 | 55 |
| D) Southwest | 10th Oct 2018 | 0815-1445 | 55 | 44 | 54 |
| | 10th July 2020 | 0700-1800 | 52 | 47 | 55 |
| E) South (Redpools) | 10th Oct 2018 | 0841-0921 | 53 | 47 | 55 |
| | 10th July 2020 | 1510-1555 | 54 | 47 | 55 |
| F) East (A38) | 10th Oct 2018 | 0935-1005 | 66 | 53 | 55 |
| | 10th July 2020 | 1608-1653 | 58 | 47 | 55 |
| G) Puckrup Lane | 10th Oct 2018 | 1414-1429 | 50 | 43 | 53 |
| | 10th July 2020 | 1220-1305 | 56 | 43 | 53 |
| H) Hotel Car Park | 10th July 2020 | 1125-1210 | 47 | 44 | 54 |
| I) Bow Lane | 10th July 2020 | 1315-1400 | 47 | 45 | 55 |

- **Q3h:** *Some typical background maximum values measured are more than those quoted for the maximum levels of the plant on site in full operation at the same point. Please justify / clarify or update accordingly.*

Response Q3h.

The measurement of background sound levels (whether LAeq, LA90 or LAmax) should always be in absence of any site generated noise. This relates to sounds formed by the existing noise climate (e.g. local and distant road traffic noise, birdsong, local public activity, farming or aircraft etc). It is not unusual for the background levels to be higher than the predicted plant noise contribution levels at receptors and all this shows is that the site generated noise is not significant.

- **Q3i:** *The excavation of material under the proposed bunds requires the submission of noise and vibration data for such workings as they would take place without any attenuation measures in place. It is the MPA's understanding that the extraction plant equipment has a higher noise level than the plant machinery used to create the bunds. Therefore, the extraction plant equipment used to create the below ground works that facilitate the creation of the bunds could form the closest operational activities to sensitive receptors and should therefore be used to set this minimum position.*

Response Q3i.

There would not be any excavation of minerals or material from under the proposed bunds. The soil would be stripped from areas of excavation and stored or used to construct the earth mound screens and placed directly onto the topsoil where the earth mounds are to be created. The minimum

distance position within the assessment is therefore correct and the noise model calculations make this assumption.

- **Q3j:** *Will the site require the use of electricity generators? Please justify/clarify or update accordingly.*

Response Q3j.

A generator would be required for the wash plant as detailed in Q3f response. The generator would be housed in an acoustically treated container adjacent to the plant and controlled by design and selection. This is included in the noise model predictions.

Q4: *Worcestershire Regulatory Services in their comments, dated 11 December 2019 and 7 February 2020, recommend the imposition of a condition requiring a Noise Management Plan should planning permission be granted. The MPA is of the opinion that in view of the comments received the MPA strongly encourages the submission of a Noise Management Plan prior to the determination of this application.*

Response Q4.

We have attached a draft noise management plan relating to noise and vibration.

Q5. *With regards to the issue of fitting “white noise” beepers to site vehicles, the MPA seeks clarification on whether such devices would be fitted to heavy goods vehicles and not just mobile plant and machinery.*

Response Q5.

All mobile plant would be fitted with ‘white noise’ reversing alarms. Not all HGVs visiting the site would be fitted with this type of alarm as some of the sites that the vehicles travel to and from only allow tonal ‘beeper’ type. However, health & safety requirements enforce the limitation of reversing on sites, as it seen as an activity having a potential risk of accident. The collections area will therefore have a one-way system so vehicles are unlikely to need to reverse. Current Regulations do not provide much control over the type of reversing alarm for HGVs at this point in time.

Q6. *There has been no monitoring within the adjacent village settlements of Ripple and Uckinghall, both of which are conservation areas. Properties to the west of the River Severn within the Bredon School area have also been ignored. Please justify/clarify or update accordingly.*

Response Q6.

The assessment does consider the nearest receptor north of the site (i.e. Receptor 1 (Silvermead) which is on the edge of Ripple. Any receptors at greater distance will be subject to lower levels of noise than the closest in this direction and therefore any impact will be similar or lower. Refer to Tables 6.1 to 6.6 for further information and noise maps in Appendix NVC/9 attached for predicted levels at greater distance.

The assessment does also consider receptors west of the River Severn (refer to Receptors 9 and 10) and Tables 6.1 to 6.6 within the assessment report and noise maps in Appendix NVC/9 attached for predicted levels at Bredon School and other properties.

Q7. *Malvern Hills District Council in their comments, dated 5 February 2020, comment that “there are a number of residential properties located close to the site boundaries. Whilst a Noise and Vibration Impact Assessment has been submitted in respect of the proposed development it would appear that noise measurements have only been assessed on a single day between the hours of 07:00hrs and 15:00hrs. Given that the workings would be located in close proximity to a number of dwellings, in particular, those located on Bow Lane I am concerned about the adequacy of the noise assessment. Further to this, I am also concerned that there appears to be insufficient stand-off distance to houses located on Bow Lane”. Please justify / clarify or update accordingly.*

Response Q7.

Refer to information provided in response Q3g above. Further baseline survey work and analysis has been undertaken and the results and conclusions of impact reached in the assessment report remain unchanged. The results show that the relevant guidance noise limits for the Proposed Development would be complied with and ‘best practicable means’ would be adopted to minimise noise as far as is practicable in accordance with the relevant standard (i.e. BS5228-1:2009+A1:2014).

INDEX TO UPDATED APPENDICES & NEW APPENDICES

| | |
|---------------|--|
| NVC/1 | SITE PLAN SHOWING NOISE SENSITIVE RECEPTORS & NOISE MONITORING POSITIONS |
| NVC/7 | PREDICTED NOISE FROM FIXED AND MOBILE PLANT ON SITE AT NOISE SENSITIVE RECEPTORS |
| NVC/8 | PLANT INVENTORY & NOISE LEVELS |
| NVC/9 | NOISE PREDICTION MAPPING |
| NVC/11 | JULY 2020 BASELINE SOUND SURVEY DETAILS & RESULTS |

NVC/1

PLAN OF SITE SHOWING SITE LOCATION, NOISE MONITORING & RECEPTOR POSITIONS

NVC/1: PLAN OF SITE SHOWING SITE LOCATION, NOISE MONITORING & RECEPTOR POSITIONS



- Spot Roaming Noise Monitoring Positions
- Fixed Position Noise Monitoring Positions (A1 - 2020 Survey Only)
- Receptor Positions

NVC/7

PREDICTED NOISE FROM FIXED AND MOBILE PLANT ON SITE AT NOISE SENSITIVE RECEPTORS

Predicted Noise Contribution from Fixed and Mobile Plant on site

Processing Plant Noise

| Phased Workings | Receptor | Range of likely noise contribution from Site LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|-----------------------|---------------------------------|--|--|---------------------------------------|
| Processing activities | 1. Silvermead (north) | 37 | 55 | None |
| | 2. Bow Farm | 45 | 54 | None |
| | 3. Puck Cottage etc (east) | 43-45 | 54 | None |
| | 4. Bowbridge Cottage etc (east) | 48-50 | 54 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 50 | 53 | None |
| | 6. Fairfield Bungalow | 51-52 | 55 | None |
| | 7. Southeast (Twynning) | 44-48 | 54 | None |
| | 8. South (Redpools) | 44 | 55 | None |
| | 9. Southwest (Windmill Tump) | 37-39 | 53* | None |
| | 10. West (The Stalls etc.) | 37-38 | 54* | None |
| | 11. Far End/Church End Nursery | 48 | 55 | None |

*Assumed to be similar to other positions due to relative position to M50 Motorway

Extraction Activities (with mitigation measures)

Soil strip & construction of boundary screening measures

| Activity | Receptor | Range of likely noise contribution from activities LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|-----------------------------------|---------------------------------|--|--|---------------------------------------|
| Temporary Construction Activities | 1. Silvermead (north) | 35-41 | 70 | None |
| | 2. Bow Farm | 44-61 | 70 | None |
| | 3. Puck Cottage etc (east) | 43-57 | 70 | None |
| | 4. Bowbridge Cottage etc (east) | 41-48 | 70 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 35-43 | 70 | None |
| | 6. Fairfield Bungalow | 34-35 | 70 | None |
| | 7. Southeast (Twynning) | 31-42 | 70 | None |
| | 8. South (Redpools) | 34-41 | 70 | None |
| | 9. Southwest (Windmill Tump) | 32-40 | 70 | None |
| | 10. West (The Stalls etc.) | 33-39 | 70 | None |
| | 11. Far End/Church End Nursery | 33-38 | 70 | None |

Note: Assumes processing plant not operating.

Extraction Phases 1 & 2 (with screening) excluding processing

| Activity | Receptor | Range of likely noise contribution from activities LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|-----------------------|---------------------------------|--|--|---------------------------------------|
| Extraction Activities | 1. Silvermead (north) | 40-42 | 55 | None |
| | 2. Bow Farm | 42-47 | 54 | None |
| | 3. Puck Cottage etc (east) | 42-51 | 54 | None |
| | 4. Bowbridge Cottage etc (east) | 42-45 | 54 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 38-39 | 53 | None |
| | 6. Fairfield Bungalow | 34-35 | 55 | None |
| | 7. Southeast (Twynning) | 36-38 | 54 | None |
| | 8. South (Redpools) | 37-38 | 55 | None |
| | 9. Southwest (Windmill Tump) | 35-38 | 53* | None |
| | 10. West (The Stalls etc.) | 34-38 | 54* | None |
| | 11. Far End/Church End Nursery | 35-36 | 55 | None |

Note: Assumes processing plant not operating.

Extraction Phases 3 to 9 & Flexible Working Areas Phase A & B (with screening) excluding processing

| Activity | Receptor | Range of likely noise contribution from activities LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|-----------------------|---------------------------------|---|---|---------------------------------------|
| Extraction Activities | 1. Silvermead (north) | 32-42 | 55 | None |
| | 2. Bow Farm | 42-52 | 54 | None |
| | 3. Puck Cottage etc (east) | 40-51 | 54 | None |
| | 4. Bowbridge Cottage etc (east) | 41-47 | 54 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 38-42 | 53 | None |
| | 6. Fairfield Bungalow | 33-36 | 55 | None |
| | 7. Southeast (Twyning) | 36-42 | 54 | None |
| | 8. South (Redpools) | 38-42 | 55 | None |
| | 9. Southwest (Windmill Tump) | 35-37 | 53* | None |
| | 10. West (The Stalls etc.) | 34-39 | 54* | None |
| | 11. Far End/Church End Nursery | 35-39 | 55 | None |

Note: Assumes processing plant not operating. *Assumed to be similar to other positions due to relative position to M50 Motorway

Restoration of Phased Working

| Activity | Receptor | Range of likely noise contribution from activities LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|----------------------------------|---------------------------------|---|---|---------------------------------------|
| Temporary Restoration Activities | 1. Silvermead (north) | 35-41 | 70 | None |
| | 2. Bow Farm | 44-61 | 70 | None |
| | 3. Puck Cottage etc (east) | 43-57 | 70 | None |
| | 4. Bowbridge Cottage etc (east) | 41-48 | 70 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 35-43 | 70 | None |
| | 6. Fairfield Bungalow | 34-35 | 70 | None |
| | 7. Southeast (Twyning) | 31-42 | 70 | None |
| | 8. South (Redpools) | 34-41 | 70 | None |
| | 9. Southwest (Windmill Tump) | 32-40 | 70 | None |
| | 10. West (The Stalls etc.) | 33-39 | 70 | None |
| | 11. Far End/Church End Nursery | 33-38 | 70 | None |

Note: Assumes processing plant not operating.

Cumulative Effect of Mineral Extraction & Processing Plant

| Activity | Receptor | Range of likely noise contribution from activities LAeq _{1hr} dB | Maximum Noise Criteria LAeq _{1hr} dB | Increase above maximum noise criteria |
|------------------------------------|---------------------------------|---|---|---------------------------------------|
| Extraction & Processing Activities | 1. Silvermead (north) | 38-44 | 55 | None |
| | 2. Bow Farm | 47-53 | 54 | None |
| | 3. Puck Cottage etc (east) | 45-52 | 54 | None |
| | 4. Bowbridge Cottage etc (east) | 49-53 | 54 | None |
| | 5. Puckrup Lane (Puckrup Hall) | 50-53 | 53 | None |
| | 6. Fairfield Bungalow | 51-53 | 55 | None |
| | 7. Southeast (Twyning) | 45-51 | 54 | None |
| | 8. South (Redpools) | 45-48 | 55 | None |
| | 9. Southwest (Windmill Tump) | 39-44 | 53* | None |
| | 10. West (The Stalls etc.) | 39-42 | 54* | None |
| | 11. Far End/Church End Nursery | 47-49 | 55 | None |

NVC/8

PLANT INVENTORY & NOISE LEVELS

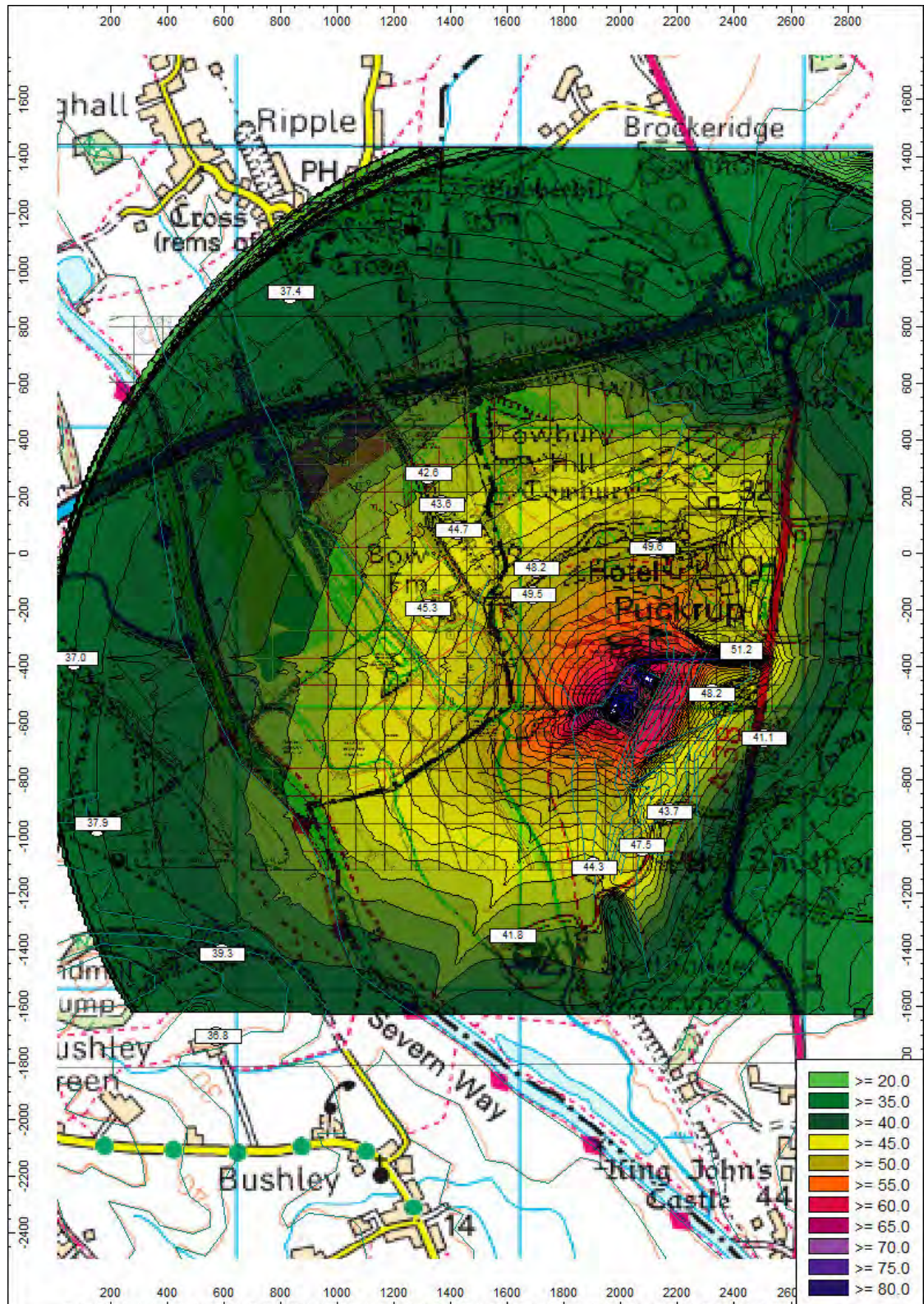
PLANT INVENTORY NOISE LEVELS

| Plant | Measured Sound Pressure Levels LAeq dB | Assumed Sound Power Levels dBA |
|---------------------------|---|---------------------------------------|
| Tracked Excavator | 77 @ 10m | 105 |
| Loading Hopper & Conveyor | 52-62 @ 10m | 80-90 |
| Water Pump | 75 @ 10m | 103 |
| Front Loader | 74 @ 10m | 102 |
| Dump Truck | 78 @ 10m | 106 |
| Power Screen & Wash Plant | 81 @ 10m | 109 |
| Bulldozer | 78 @ 10m | 106 |
| HGV | 73 @ 10m | 101 |
| Concrete Batching Plant | 77 @ 10m | 105 |
| Concrete Batching Pump | 92 @ 1m | 103 |
| Front Shovel Loader | 79 @ 10m | 107 |
| Generator (wash plant) | 67 @ 10m | 95 |

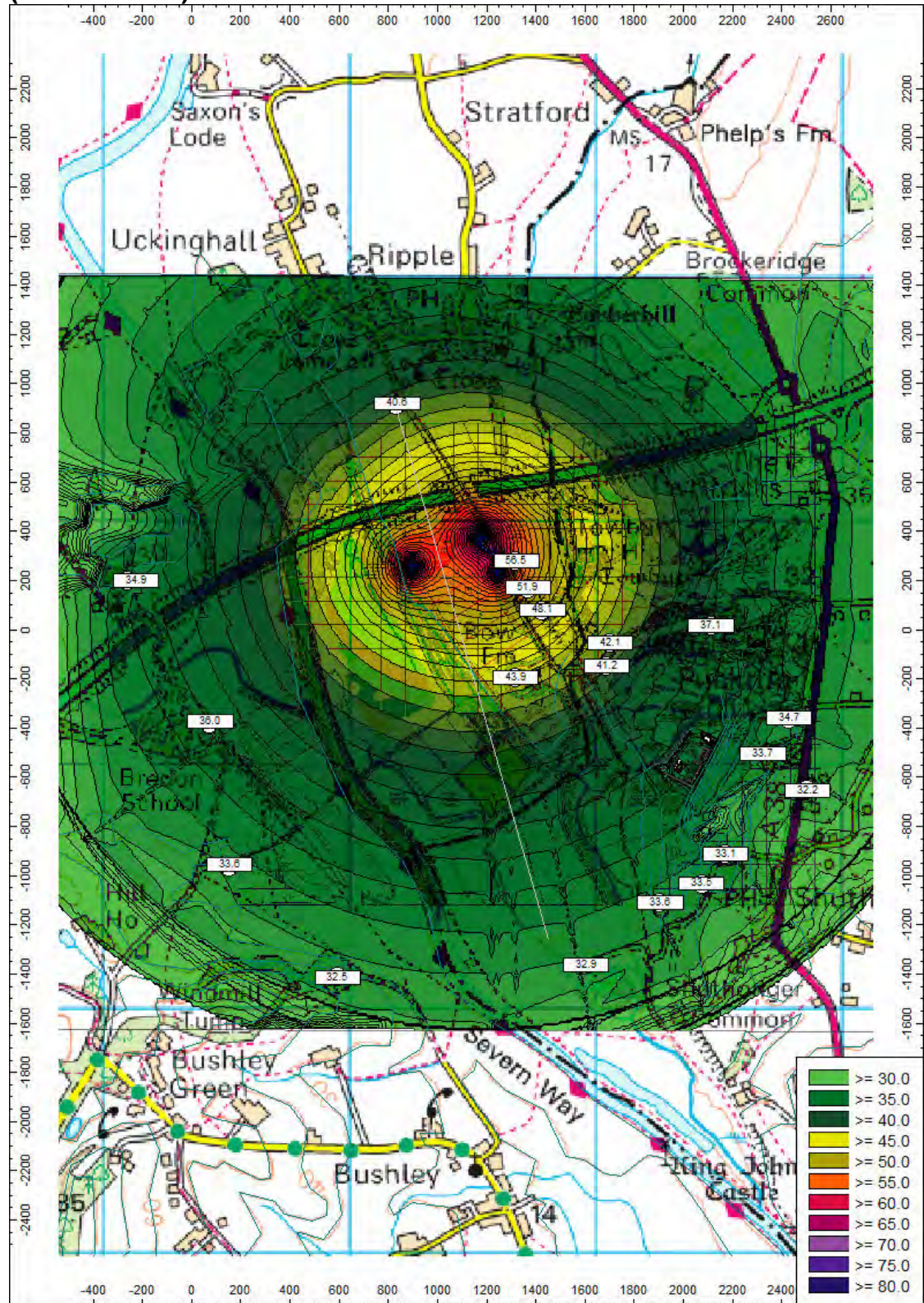
NVC/9

NOISE PREDICTION MAPPING SITE EXTRACTION & PROCESSING AREAS

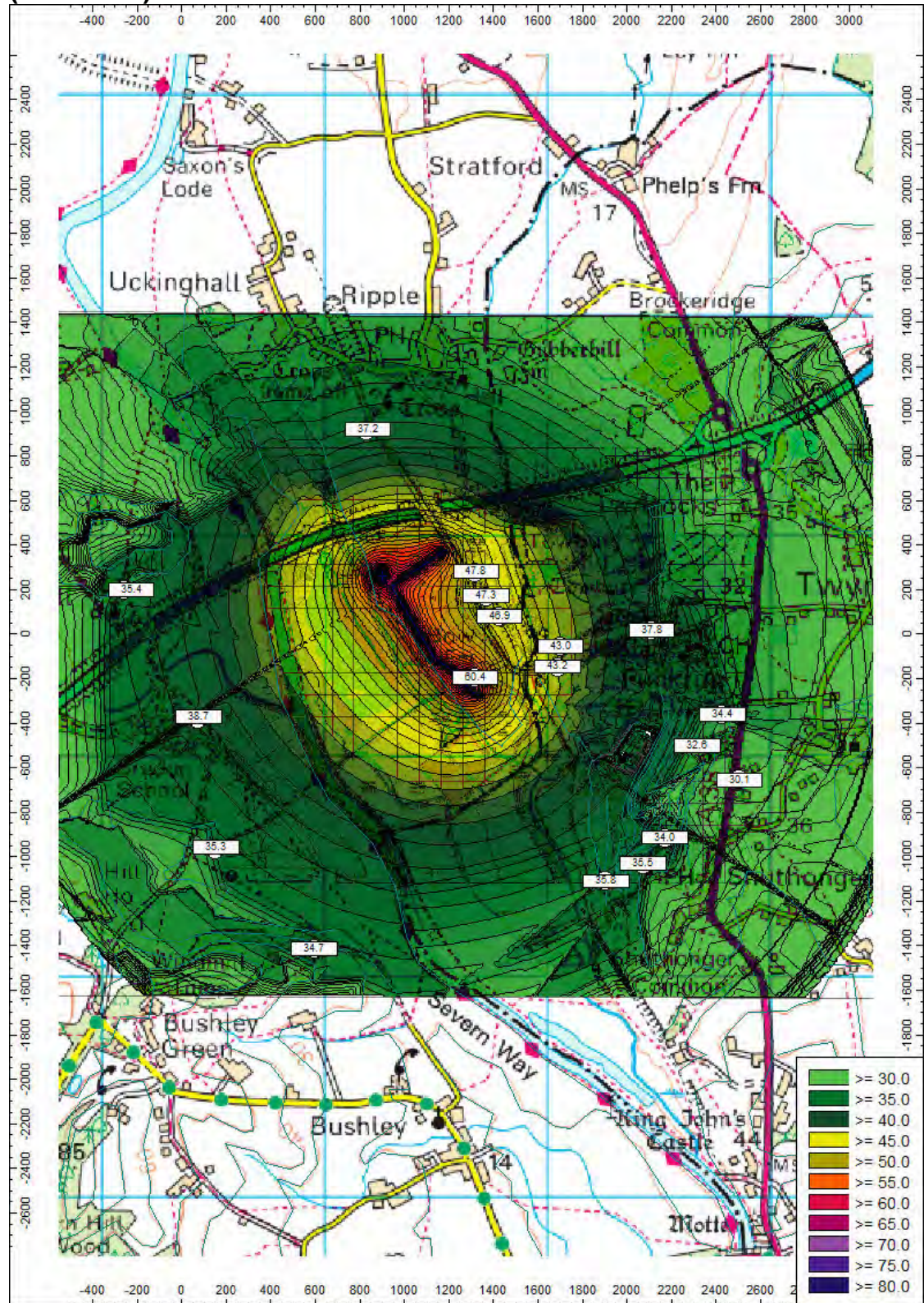
NOISE MAP 1: PROCESSING PLANT



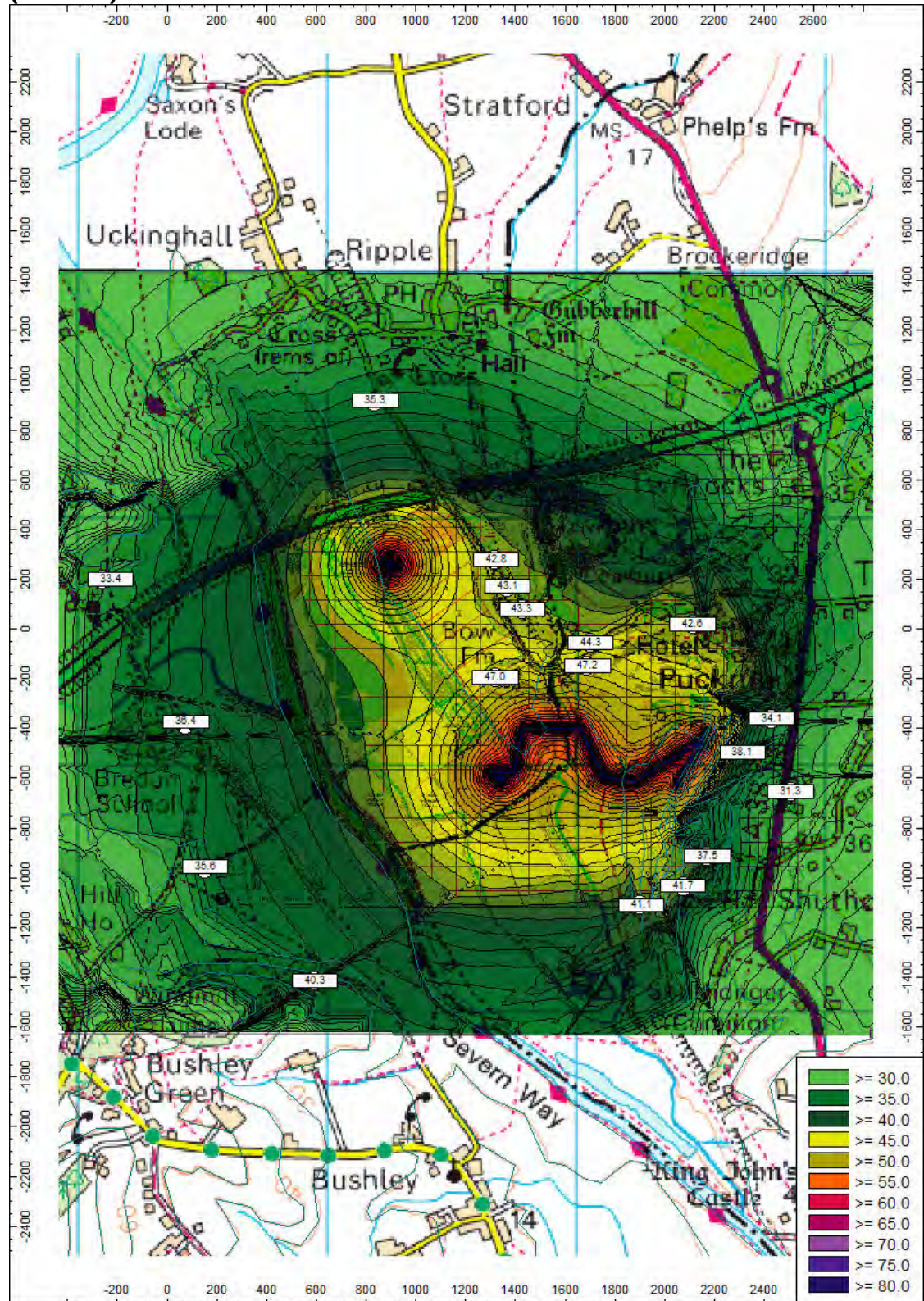
NOISE MAP 2: CONSTRUCTION OF EARTH MOUND SCREENING (NORTHEAST)



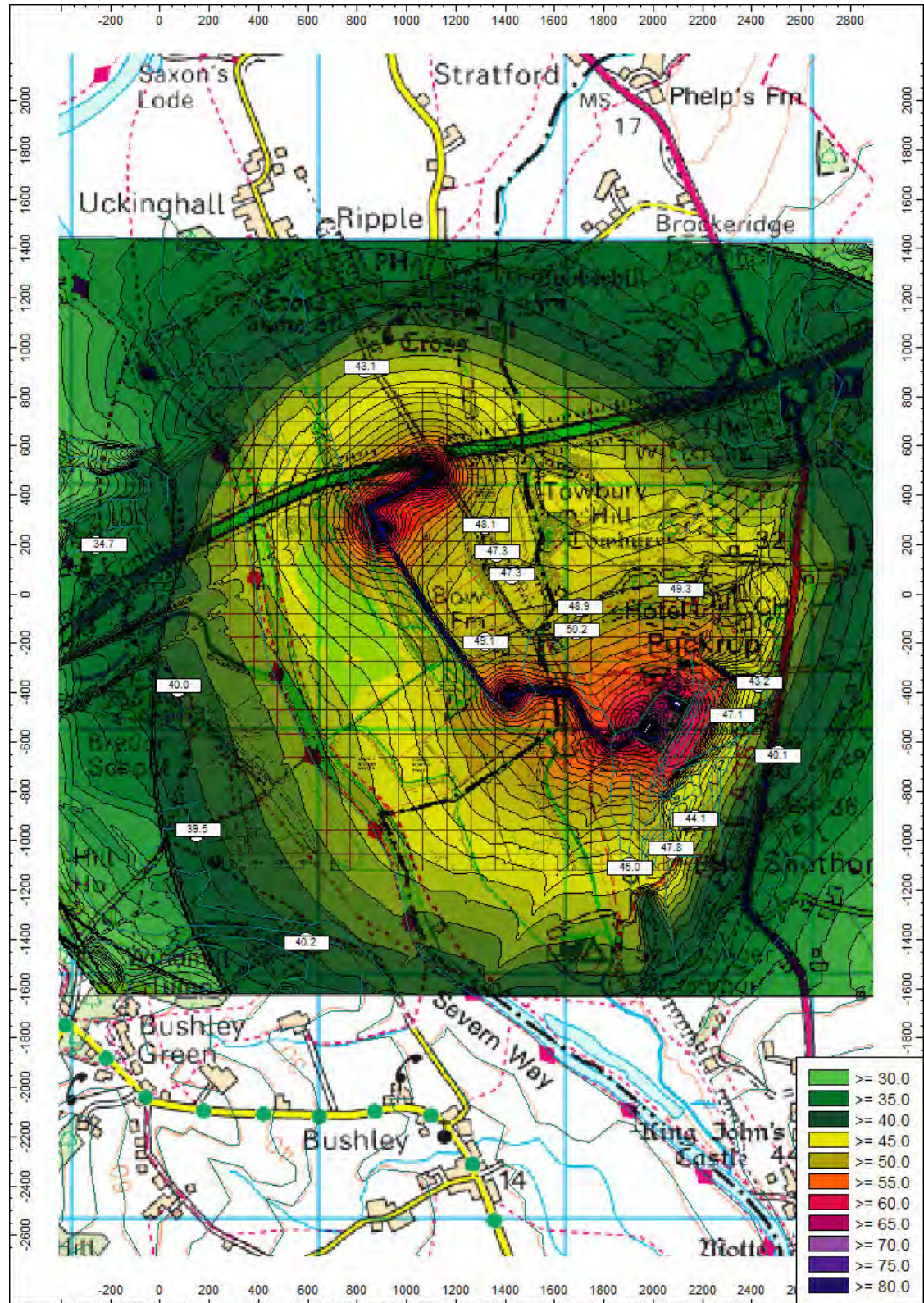
NOISE MAP 3: CONSTRUCTION OF EARTH MOUND SCREENING (CENTRAL)



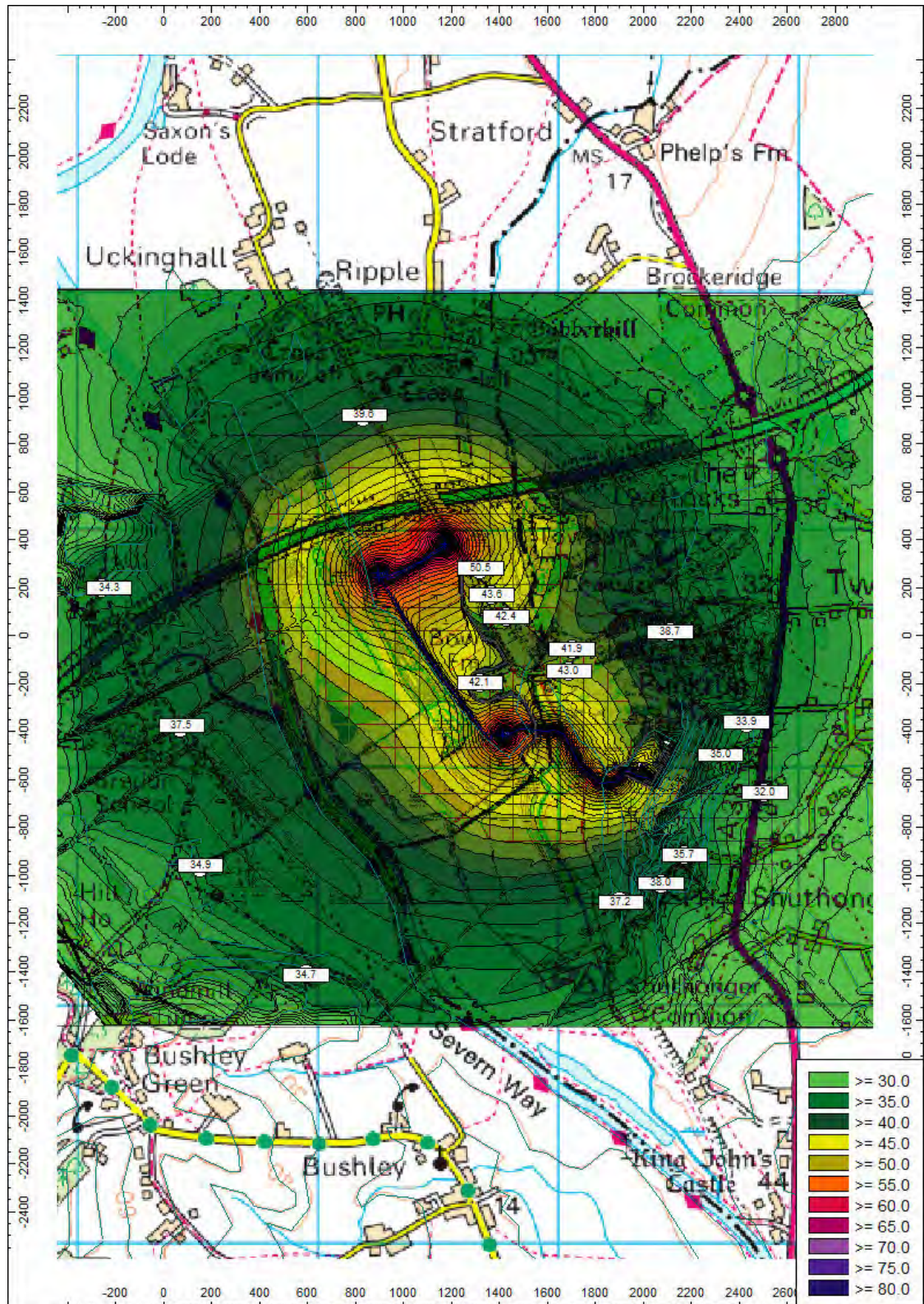
NOISE MAP 4: CONSTRUCTION OF EARTH MOUND SCREENING (SOUTH)



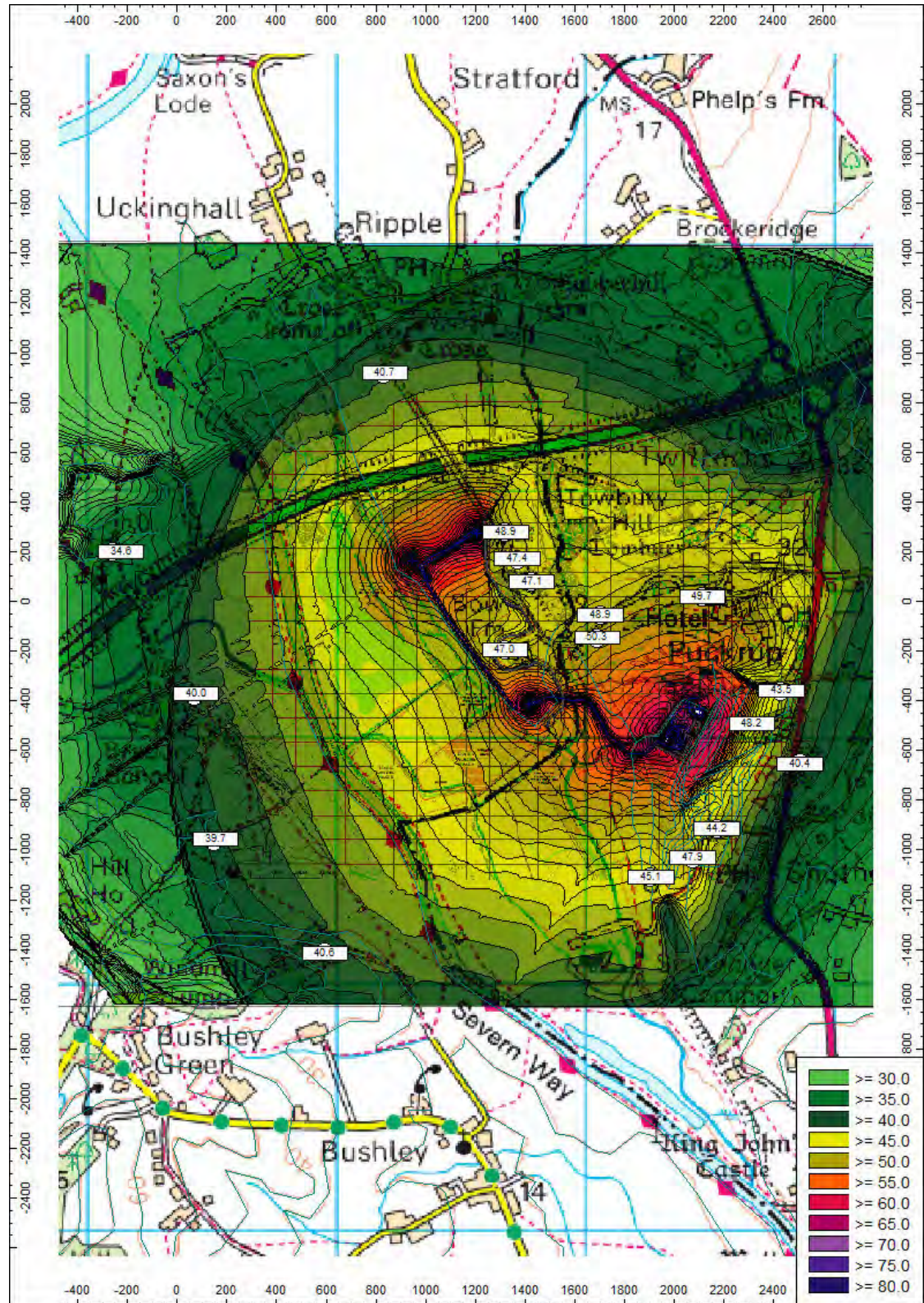
NOISE MAP 5: EXTRACTION ACTIVITIES PHASES 1 & 2 WITH PROCESSING



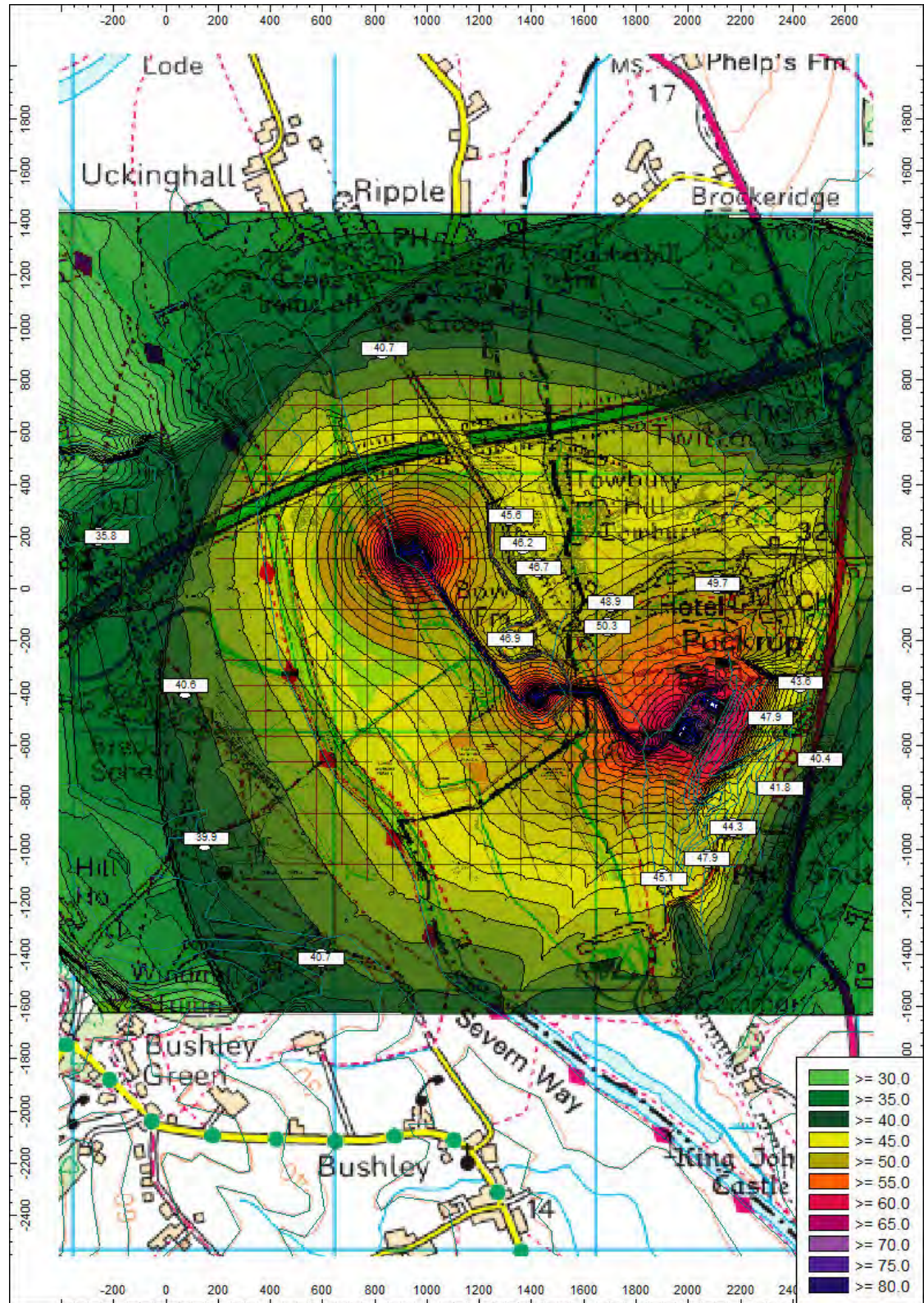
NOISE MAP 6: EXTRACTION ACTIVITIES PHASES 1 & 2



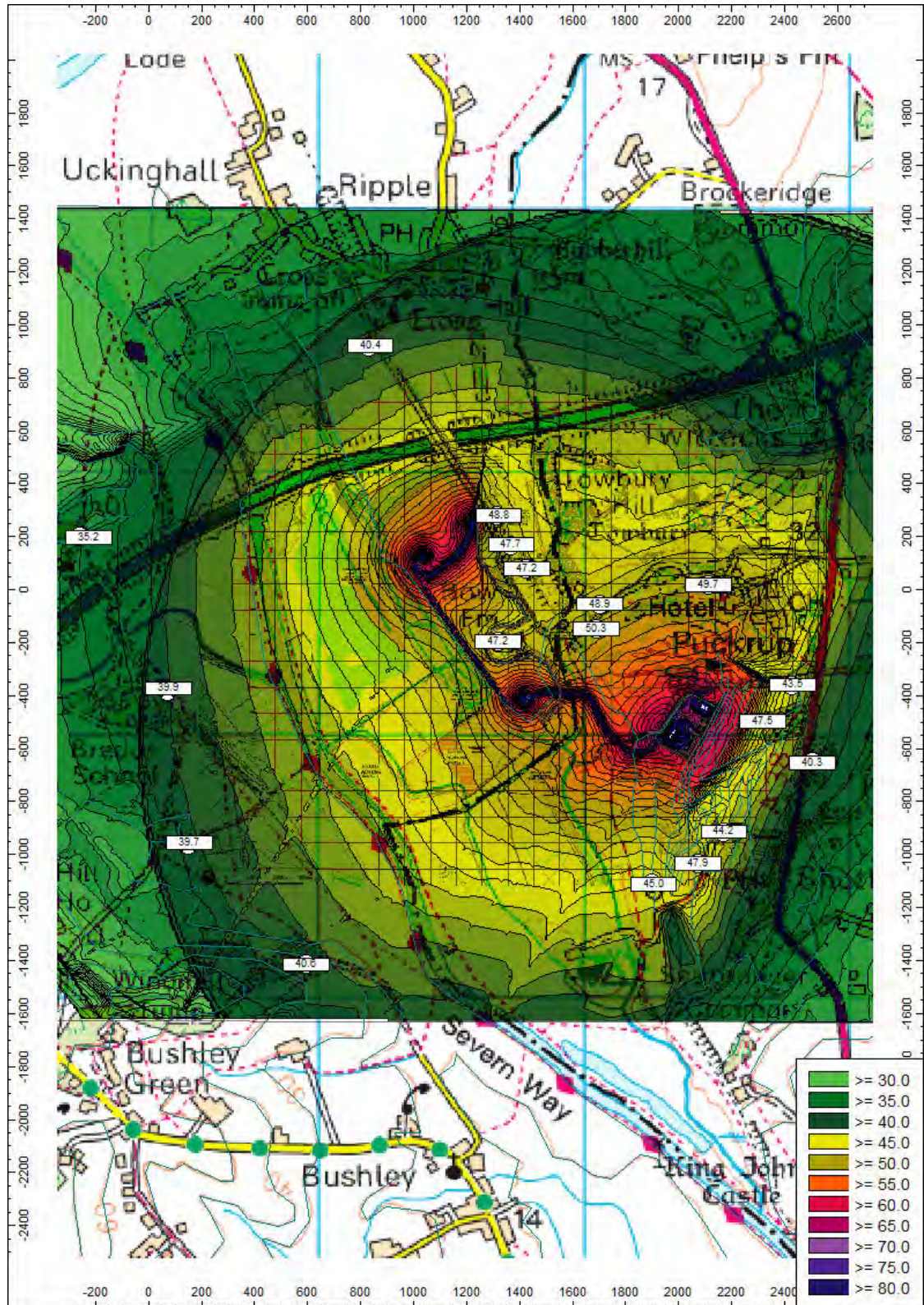
NOISE MAP 7: EXTRACTION ACTIVITIES PHASES 3 & 4 WITH PROCESSING



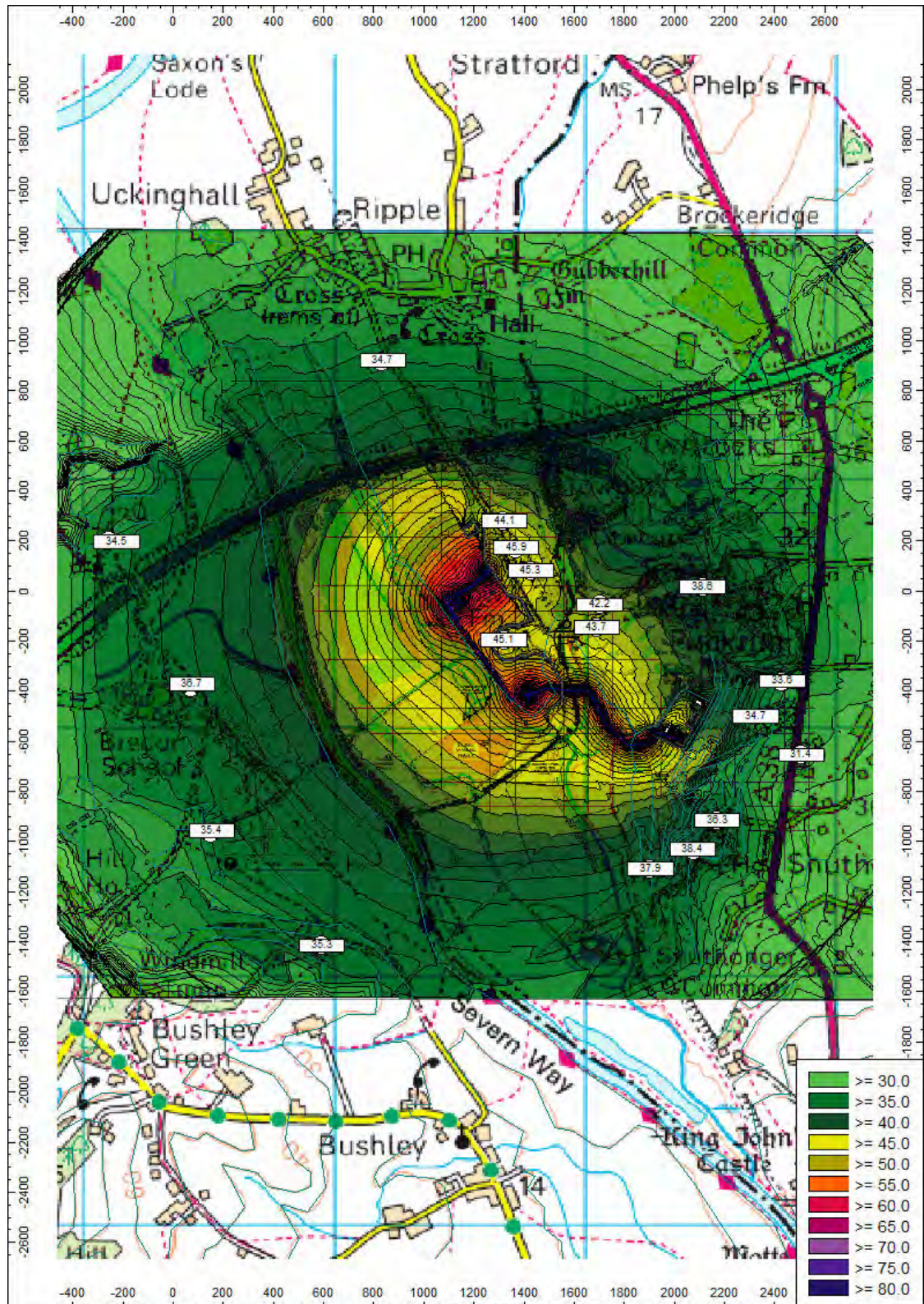
NOISE MAP 8: EXTRACTION ACTIVITIES PHASES 3 & 4 WITH PROCESSING



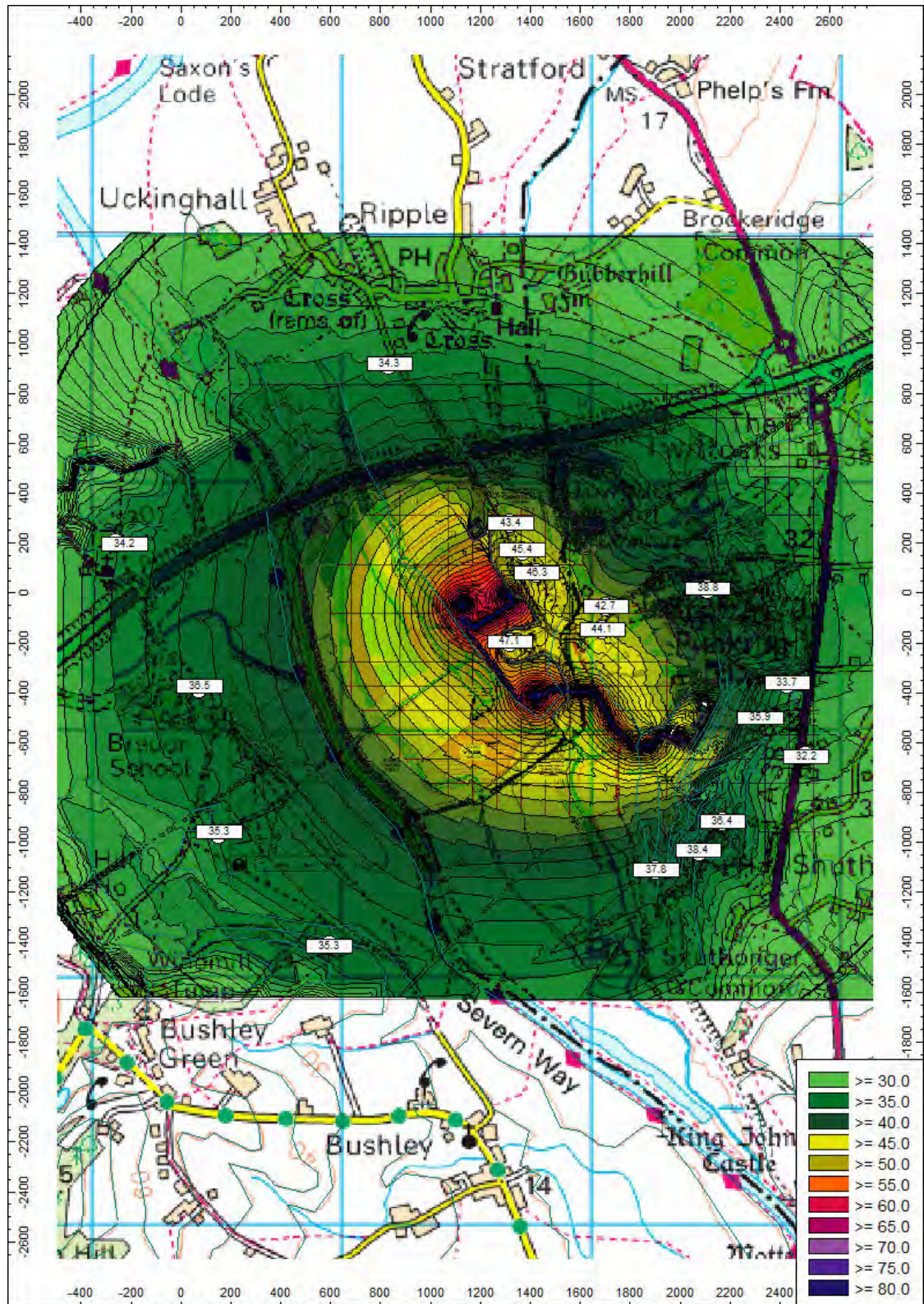
NOISE MAP 9: EXTRACTION ACTIVITIES PHASES 3 & 4 WITH PROCESSING



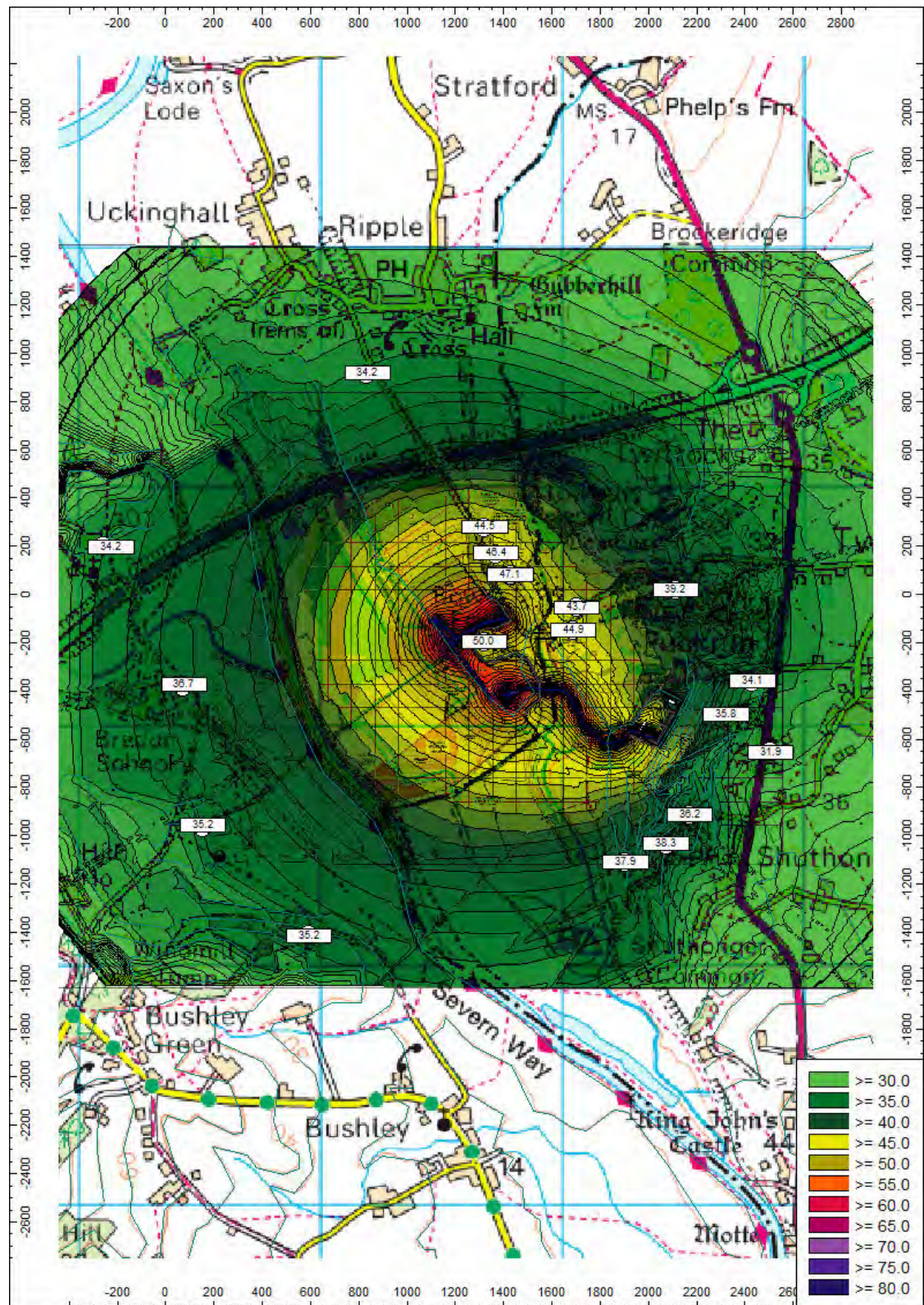
NOISE MAP 10: EXTRACTION ACTIVITIES PHASES 5 & 6



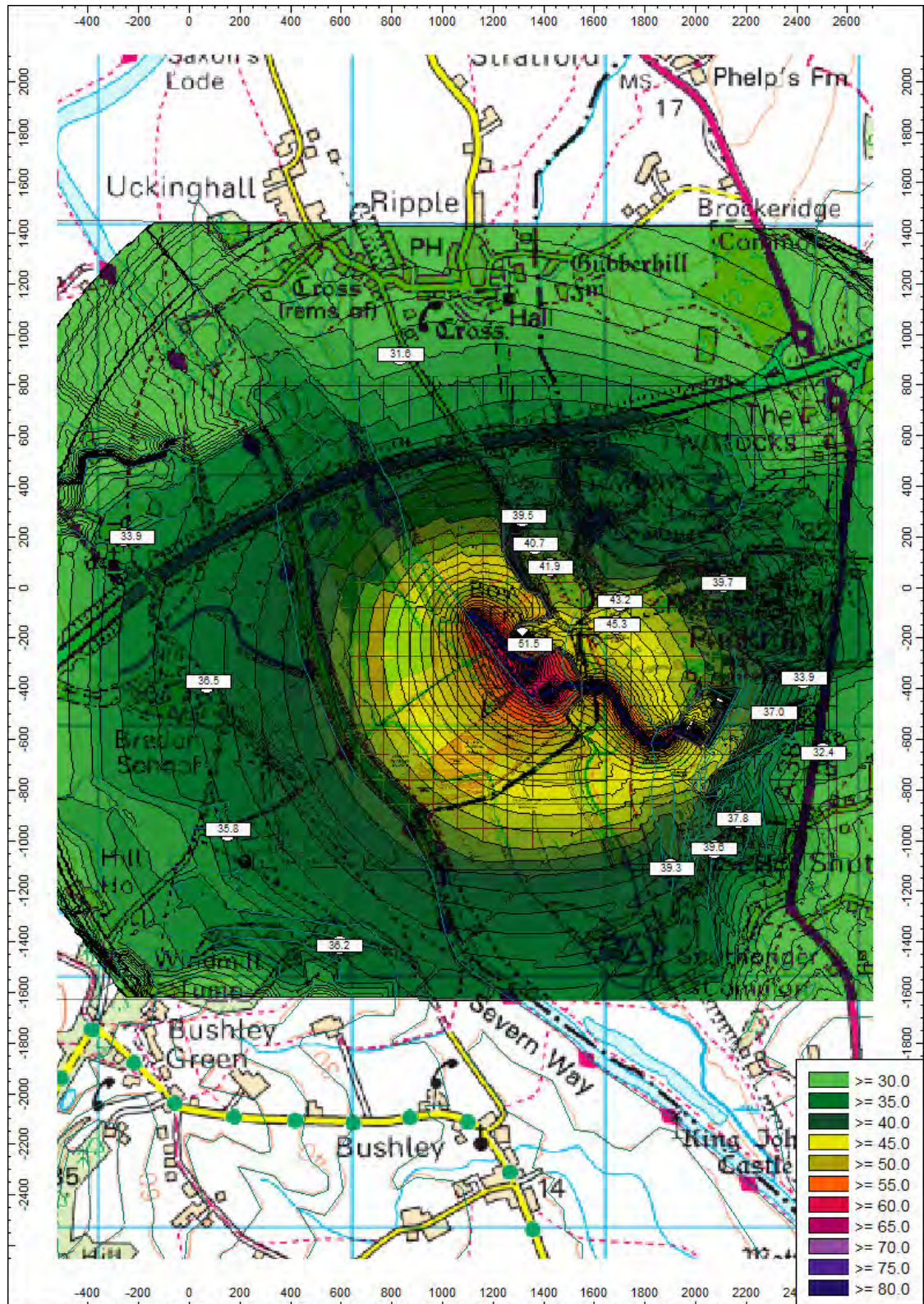
NOISE MAP 11: EXTRACTION ACTIVITIES PHASES 5 & 6



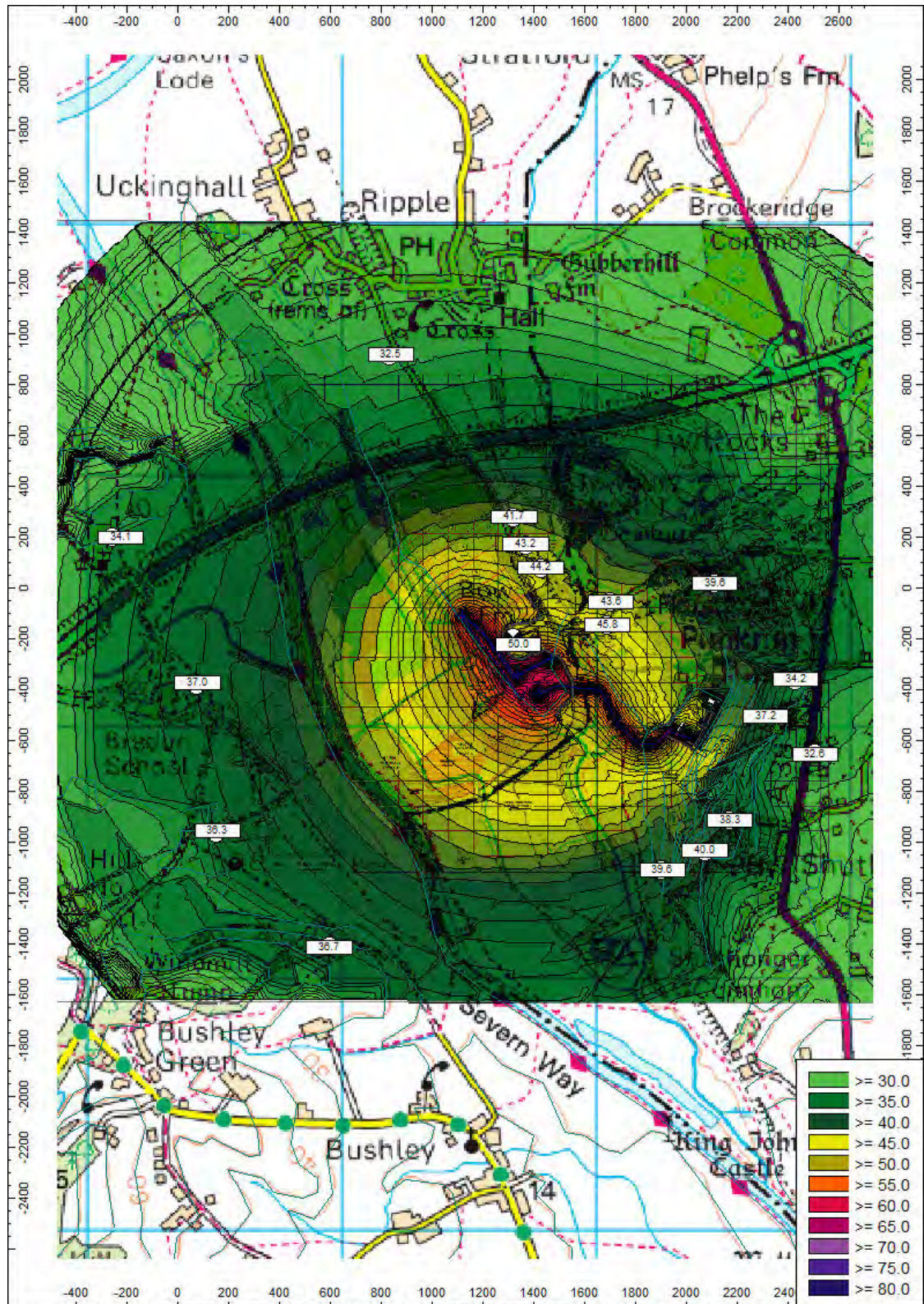
NOISE MAP 12: EXTRACTION ACTIVITIES PHASES 7 & 8



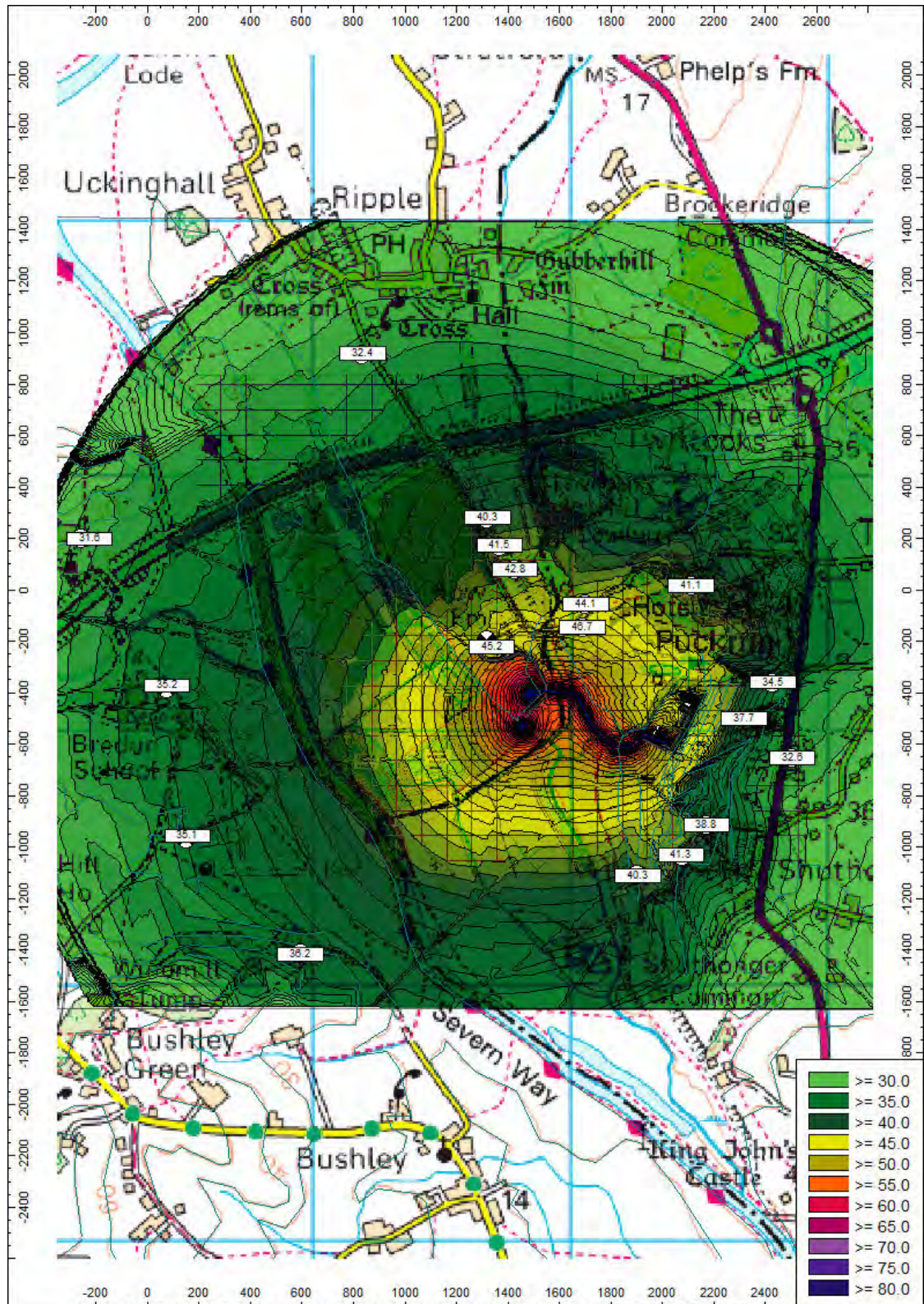
NOISE MAP 14: EXTRACTION ACTIVITIES PHASES 7 & 8



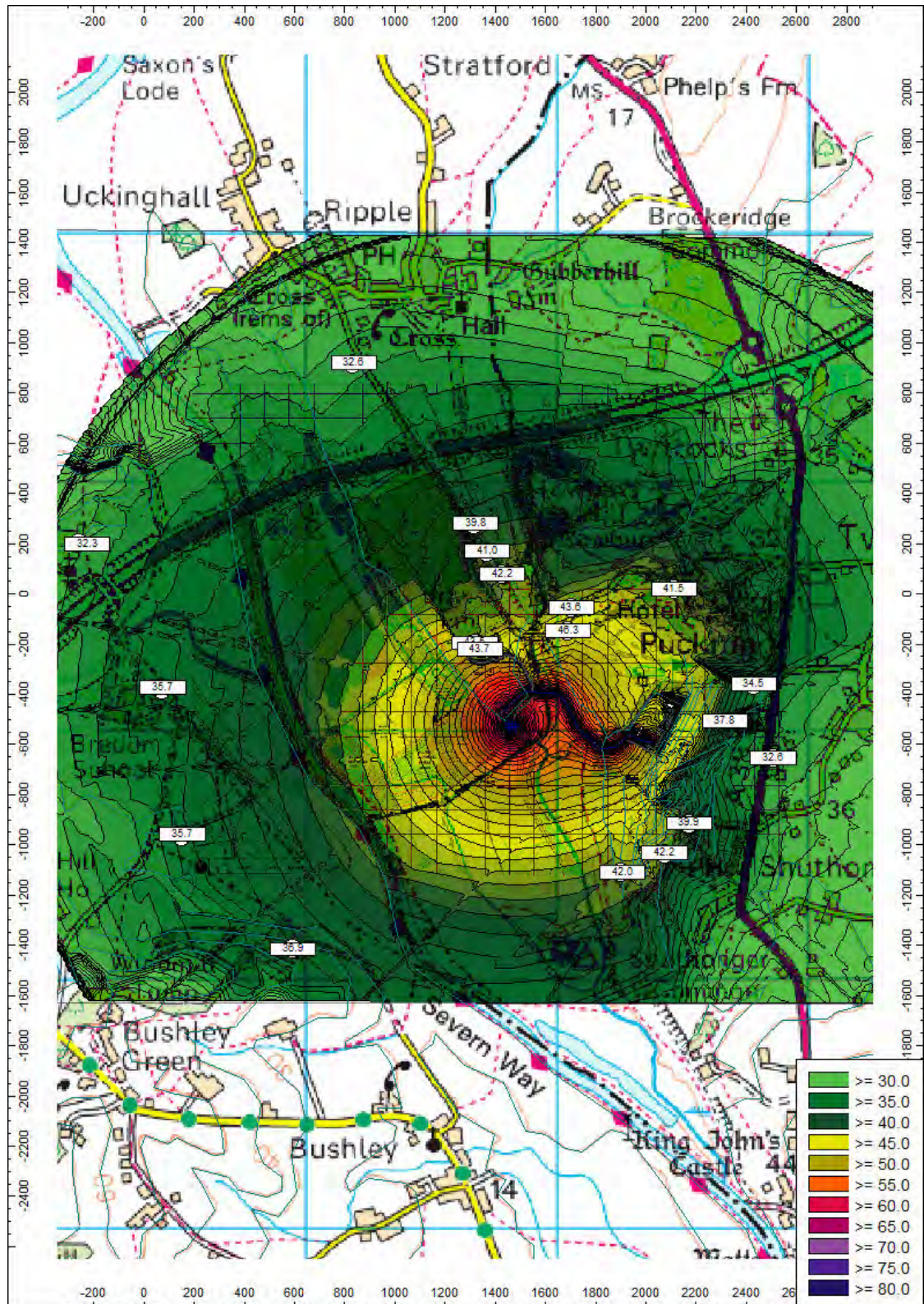
NOISE MAP 15: EXTRACTION ACTIVITIES PHASES 7 & 8



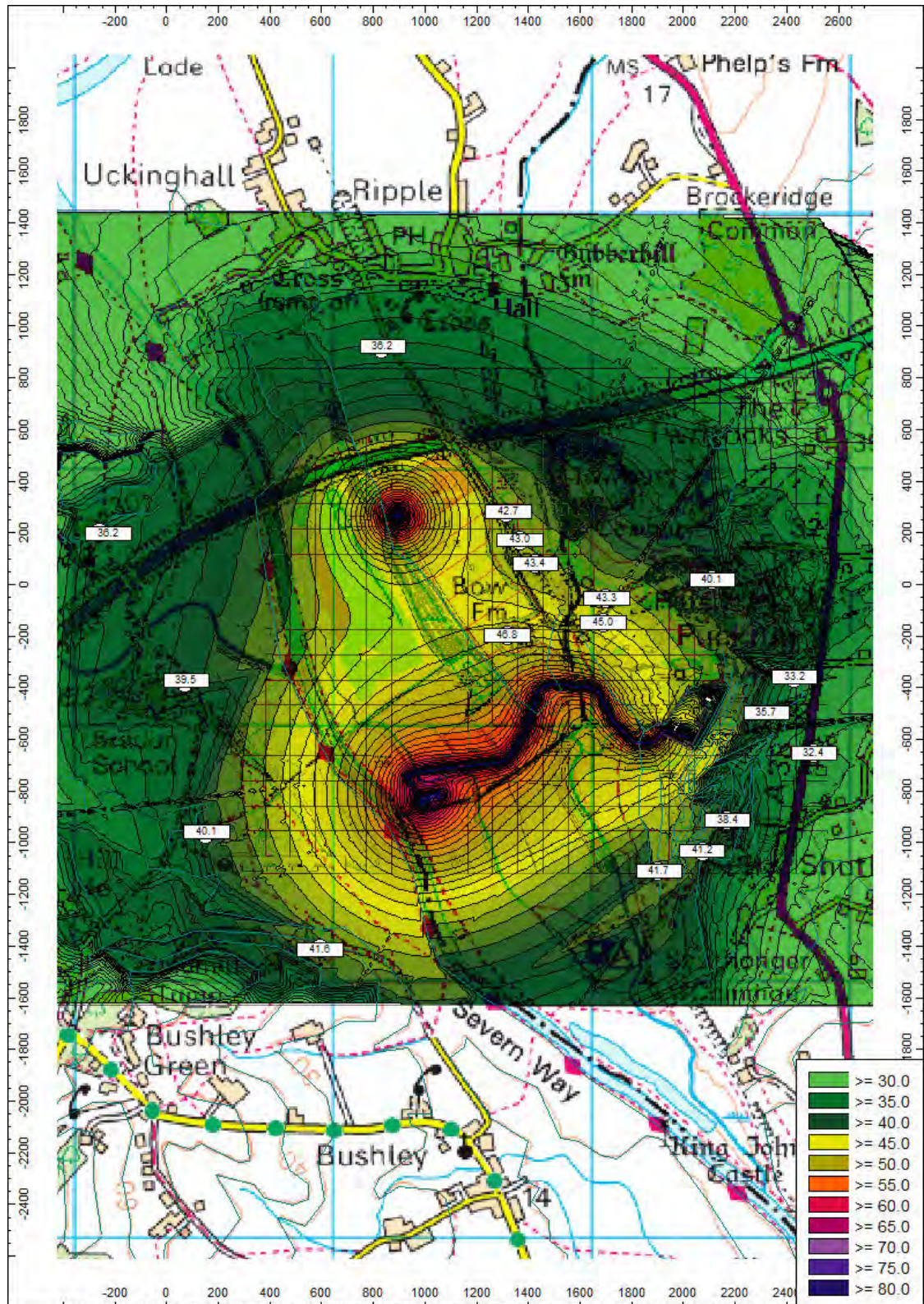
NOISE MAP 16: EXTRACTION ACTIVITIES PHASE 9



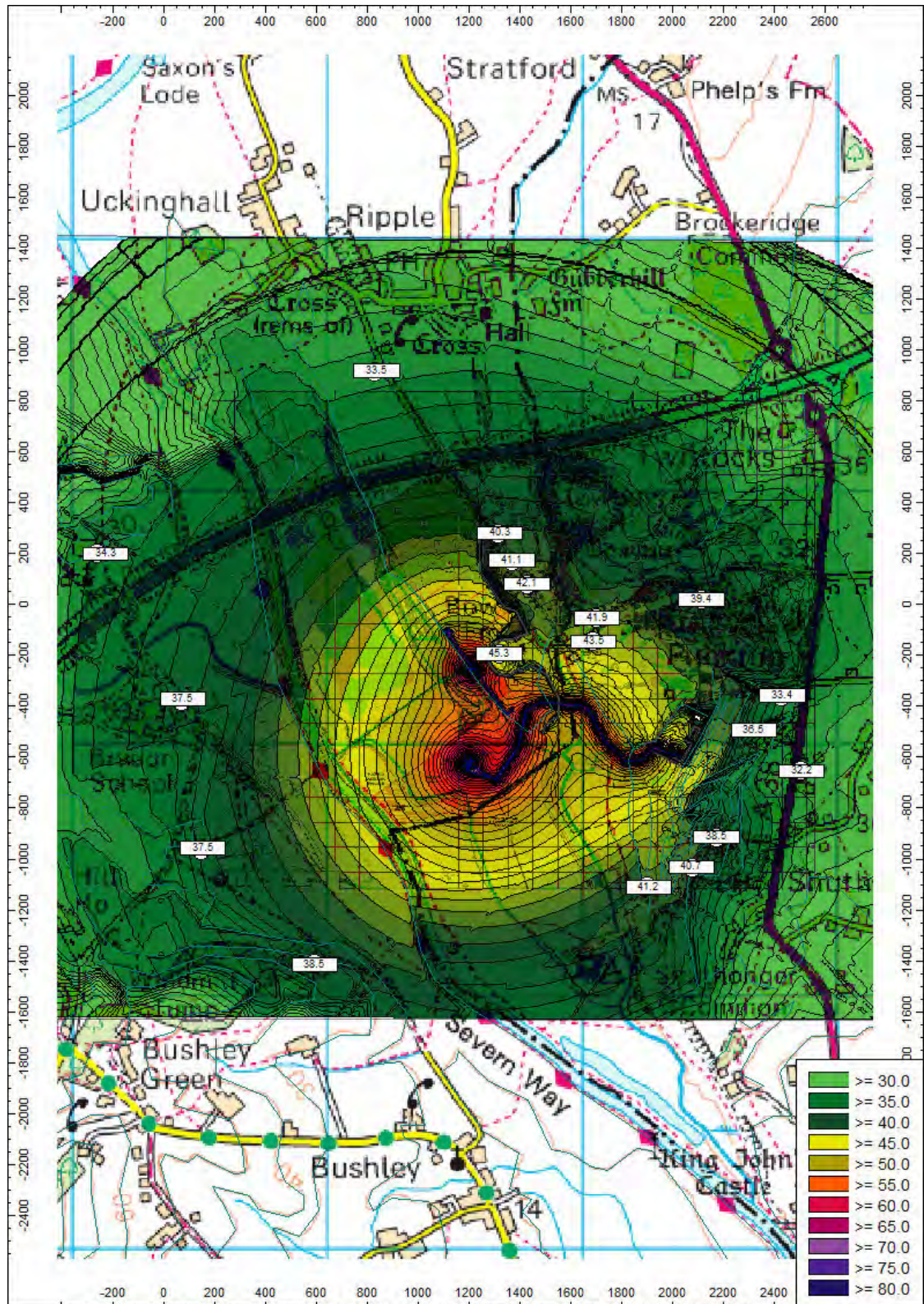
NOISE MAP 17: EXTRACTION ACTIVITIES PHASE 9



NOISE MAP 18: EXTRACTION PHASE 1 FLEXIBLE WORKING



NOISE MAP 19: EXTRACTION PHASES 7 & 8 FLEXIBLE WORKING



NVC/11

JULY 2020 BASELINE SOUND SURVEY DETAILS & RESULTS

BASELINE SOUND SURVEY DETAILS:

The following instrumentation was used for all noise measurements:

Instrumentation:

| Manufacturer | Description | Type | Calibration Due date | Serial No. |
|---------------------|-------------------------------|-------------|-----------------------------|-------------------|
| Cirrus | Real time Analyser | CR:1710 | April 2021 | G066350 |
| Cirrus | Integrating Sound Level Meter | 171A | June 2021 | G061253 |
| Cirrus | Real time analyser | 171B | April 2021 | G056142 |
| Norsonic | Real time analyser | 116 | August 2020 | 27342 |
| Norsonic | Real time analyser | 118 | August 2020 | 31992 |
| Cirrus | Electronic Calibrator | CR: 513A | April 2021 | 031523 |

The noise meters used during the survey is a precision grade type 1 meter to IEC 651 standard and accuracy.

Calibration Setting: 94dB @ 1 kHz

Meter Setting: Fast Response

Fieldwork Details:

Site: Bow Farm Quarry Site, Gloucestershire

Date of test: Wednesday 10th July 2020

Start Time: 0700 to 1800 hours

Calibration: Before and after: 94dB at 1kHz

Survey Description and Procedure:

Background sound measurements were taken in the vicinity of the nearest residential properties during a typical daytime period. Refer to Appendix NVC/1 for fixed and spot roaming sound monitoring locations.

Background noise readings were taken at a height of 1.5m from the ground. Readings of LAeq, LA10, LA90 and LAm_{ax} were recorded over 15-minute intervals.

Calibration

The noise meters were calibrated with the electronic calibrator prior to commencement and on completion of the survey. No significant drift in calibration was observed.

Meteorological Conditions

Weather details were recorded during the period of the survey and are detailed below:

Wednesday 10th July 2020

Dry, variable cloud, sunny intervals, light northwest winds (1-2m/s), temperature ranging between 13deg and 18degC.

Observations at site indicated that the sound climate is formed by local and distant road traffic movements and birdsong.

The above climatic conditions were suitable for monitoring environmental noise levels in accordance with advice given in BS7445: 2003 'Description and measurement of environmental noise'

BASELINE SOUND SURVEY RESULTS JULY 2020

Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 1

Client: Moreton C Cullimore

Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position A1 - Bow Lane North**

Instrumentation: Norsonic 116 Real Time Analyser (27342)

Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 07:00 | 15:00 | 58.0 | 60.4 | 54.4 | 69.1 | |
| 07:15 | 15:00 | 58.4 | 60.8 | 54.8 | 65.8 | |
| 07:30 | 15:00 | 58.2 | 60.5 | 54.6 | 69.3 | |
| 07:45 | 15:00 | 58.2 | 60.4 | 55.1 | 73.9 | |
| 08:00 | 15:00 | 58.0 | 60.0 | 55.0 | 72.2 | |
| 08:15 | 15:00 | 57.6 | 59.6 | 54.1 | 72.3 | |
| 08:30 | 15:00 | 57.2 | 59.8 | 53.3 | 71.2 | |
| 08:45 | 15:00 | 56.9 | 59.1 | 53.2 | 67.3 | |
| 09:00 | 15:00 | 57.1 | 59.3 | 53.6 | 69.6 | |
| 09:15 | 15:00 | 57.6 | 59.4 | 54.0 | 73.3 | |
| 09:30 | 15:00 | 59.8 | 60.5 | 54.2 | 74.1 | |
| 09:45 | 15:00 | 59.8 | 59.8 | 53.1 | 75.5 | |
| 10:00 | 15:00 | 56.9 | 59.0 | 53.8 | 63.0 | |
| 10:15 | 15:00 | 58.0 | 59.8 | 53.8 | 72.4 | |
| 10:30 | 15:00 | 57.6 | 60.0 | 53.5 | 72.2 | |
| 10:45 | 15:00 | 57.5 | 59.7 | 54.2 | 65.5 | |
| 11:00 | 15:00 | 56.6 | 58.6 | 53.6 | 67.5 | |
| 11:15 | 15:00 | 57.8 | 59.3 | 54.3 | 74.7 | |
| 11:30 | 15:00 | 57.6 | 59.3 | 55.1 | 68.1 | |
| 11:45 | 15:00 | 57.5 | 59.7 | 54.4 | 64.7 | |
| 12:00 | 15:00 | 54.3 | 56.9 | 49.7 | 67.8 | |
| 12:15 | 15:00 | 56.9 | 58.2 | 53.6 | 65.8 | |
| Log Average 0700-1230 | | 57.7 | 59.6 | 53.9 | 63-76 | |
| Average 0700-1230 | | 57.6 | 59.6 | 53.9 | 63-76 | |

Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 2

Client: Moreton C Cullimore

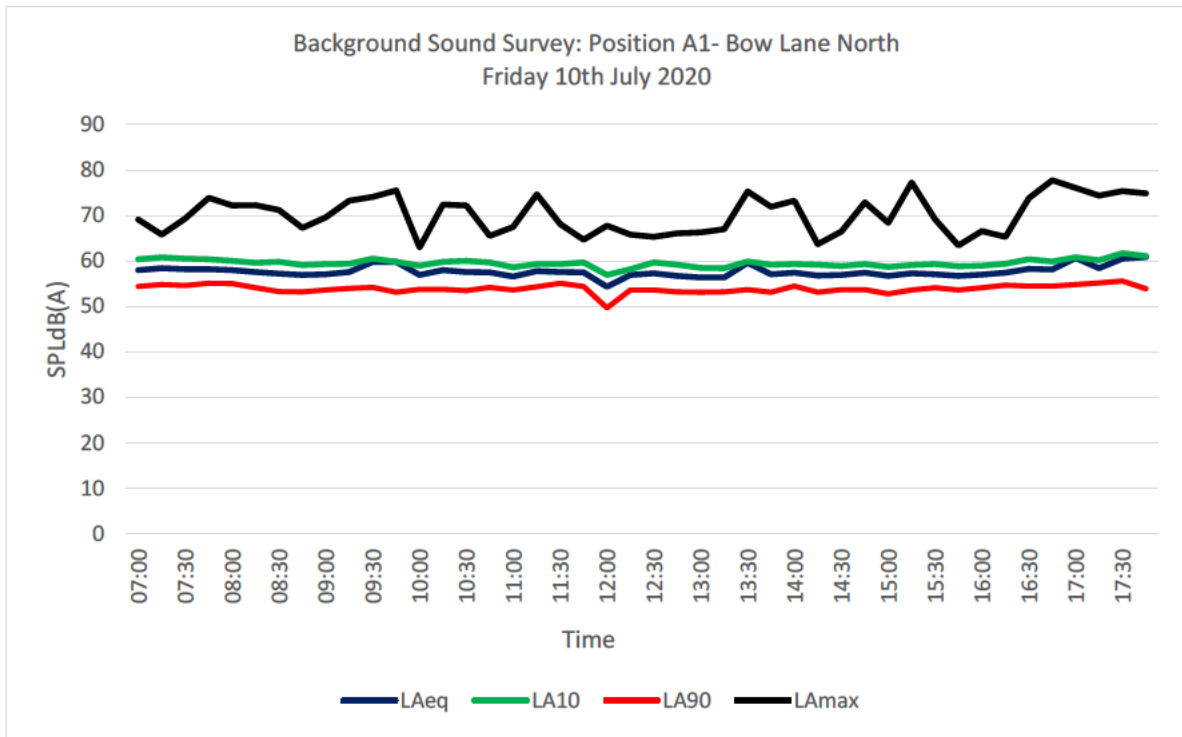
Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position A1 - Bow Lane North**

Instrumentation: Norsonic 116 Real Time Analyser (27342)

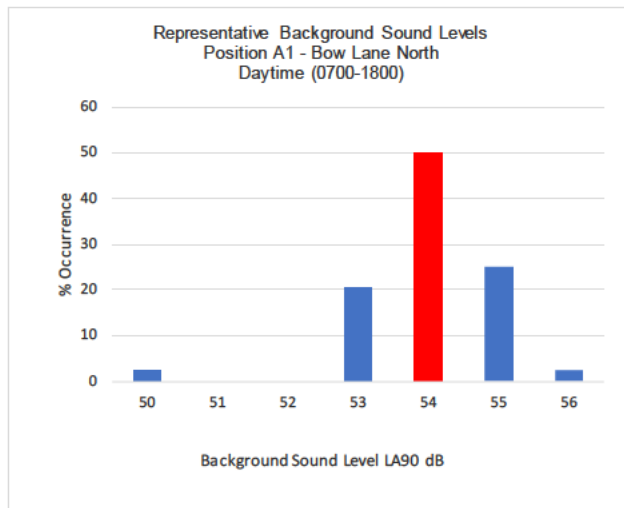
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 12:30 | 15:00 | 57.3 | 59.7 | 53.6 | 65.3 | |
| 12:45 | 15:00 | 56.7 | 59.2 | 53.2 | 66.1 | |
| 13:00 | 15:00 | 56.4 | 58.5 | 53.1 | 66.3 | |
| 13:15 | 15:00 | 56.4 | 58.4 | 53.2 | 67.0 | |
| 13:30 | 15:00 | 59.6 | 59.9 | 53.7 | 75.3 | |
| 13:45 | 15:00 | 57.1 | 59.2 | 53.1 | 71.9 | |
| 14:00 | 15:00 | 57.4 | 59.3 | 54.5 | 73.3 | |
| 14:15 | 15:00 | 56.8 | 59.2 | 53.1 | 63.7 | |
| 14:30 | 15:00 | 56.9 | 58.9 | 53.7 | 66.5 | |
| 14:45 | 15:00 | 57.4 | 59.3 | 53.7 | 72.9 | |
| 15:00 | 15:00 | 56.7 | 58.7 | 52.8 | 68.4 | |
| 15:15 | 15:00 | 57.3 | 59.1 | 53.6 | 77.3 | |
| 15:30 | 15:00 | 57.1 | 59.3 | 54.1 | 69.2 | |
| 15:45 | 15:00 | 56.7 | 58.8 | 53.6 | 63.4 | |
| 16:00 | 15:00 | 57.0 | 59.0 | 54.1 | 66.6 | |
| 16:15 | 15:00 | 57.4 | 59.4 | 54.7 | 65.3 | |
| 16:30 | 15:00 | 58.3 | 60.4 | 54.5 | 73.8 | |
| 16:45 | 15:00 | 58.1 | 59.9 | 54.5 | 77.8 | |
| 17:00 | 15:00 | 60.7 | 60.8 | 54.8 | 76.1 | |
| 17:15 | 15:00 | 58.4 | 60.2 | 55.2 | 74.4 | |
| 17:30 | 15:00 | 60.5 | 61.7 | 55.6 | 75.4 | |
| 17:45 | 15:00 | 60.9 | 61.1 | 53.9 | 74.9 | |
| Log Average 1230-1800 | | 58.0 | 59.6 | 53.9 | 63-78 | |
| Average 1230-1800 | | 57.8 | 59.5 | 53.9 | 63-78 | |
| Average 0700-1800 | | 57.8 | 59.6 | 53.9 | | |



LA90 Representative Levels

| LA90 | % Occurrence |
|-----------|--------------|
| 50 | 2.3 |
| 51 | 0 |
| 52 | 0 |
| 53 | 20.5 |
| 54 | 50 |
| 55 | 25 |
| 56 | 2.3 |



Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 3

Client: Moreton C Cullimore

Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position B - Bow Farm (Bow Lane South)**

Instrumentation: Cirrus 171A Real Time Analyser (G066350)

Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 07:00 | 15:00 | 50.1 | 51.2 | 44.7 | 69.8 | |
| 07:15 | 15:00 | 51.0 | 50.7 | 45.4 | 75.1 | |
| 07:30 | 15:00 | 47.4 | 47.7 | 44.4 | 68.3 | |
| 07:45 | 15:00 | 51.5 | 49.6 | 44.6 | 73.5 | |
| 08:00 | 15:00 | 54.0 | 49.7 | 44.1 | 81.5 | |
| 08:15 | 15:00 | 51.3 | 51.0 | 43.9 | 72.2 | |
| 08:30 | 15:00 | 47.4 | 49.7 | 42.5 | 63.8 | |
| 08:45 | 15:00 | 55.3 | 48.4 | 43.5 | 85.6 | |
| 09:00 | 15:00 | 54.3 | 48.5 | 43.6 | 82.7 | |
| 09:15 | 15:00 | 48.9 | 48.6 | 43.5 | 68.7 | |
| 09:30 | 15:00 | 52.3 | 52.1 | 43.6 | 76.1 | |
| 09:45 | 15:00 | 54.2 | 52.6 | 43.8 | 81.0 | |
| 10:00 | 15:00 | 50.0 | 49.7 | 43.7 | 70.3 | |
| 10:15 | 15:00 | 47.2 | 47.7 | 42.5 | 69.5 | |
| 10:30 | 15:00 | 49.5 | 50.6 | 41.6 | 71.6 | |
| 10:45 | 15:00 | 47.2 | 48.2 | 43.9 | 64.2 | |
| 11:00 | 15:00 | 55.2 | 52.4 | 43.1 | 82.6 | |
| 11:15 | 15:00 | 50.1 | 49.5 | 43.7 | 68.2 | |
| 11:30 | 15:00 | 51.8 | 52.0 | 43.3 | 73.6 | |
| 11:45 | 15:00 | 52.5 | 52.4 | 44.2 | 72.6 | |
| 12:00 | 15:00 | 52.9 | 49.9 | 42.1 | 74.7 | |
| 12:15 | 15:00 | 49.9 | 49.9 | 42.1 | 69.9 | |
| Log Average 0700-1230 | | 51.8 | 50.3 | 43.6 | 64-86 | |
| Average 0700-1230 | | 51.1 | 50.1 | 43.5 | 64-86 | |

Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 4

Client: Moreton C Cullimore

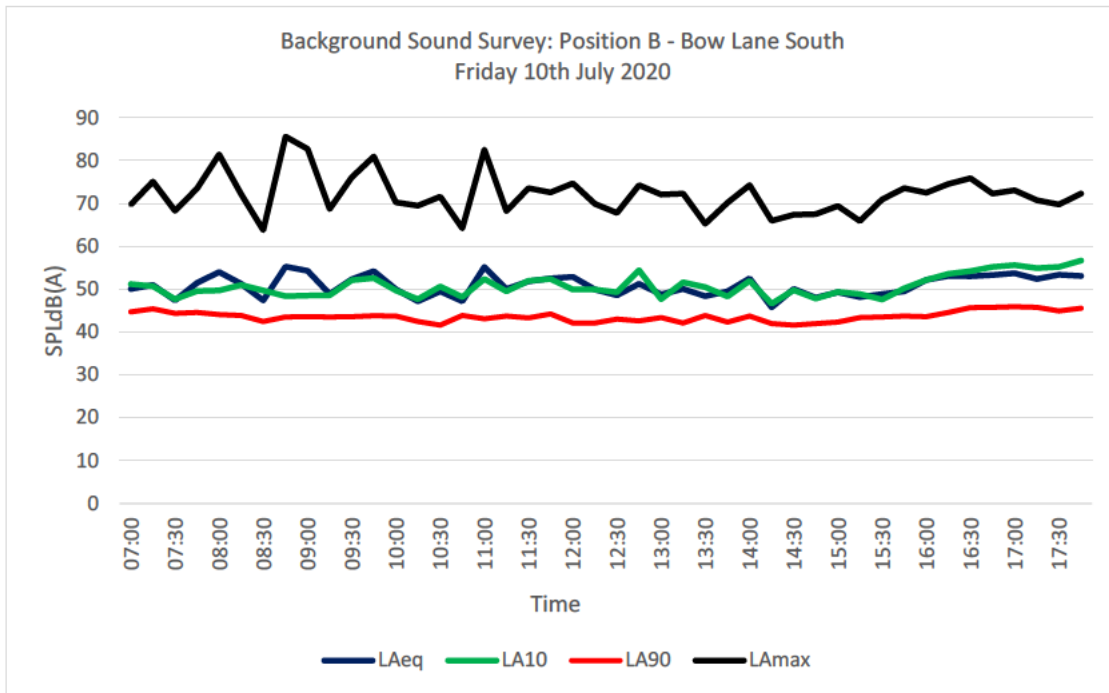
Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position B - Bow Farm (Bow Lane South)**

Instrumentation: Cirrus 171A Real Time Analyser (G066350)

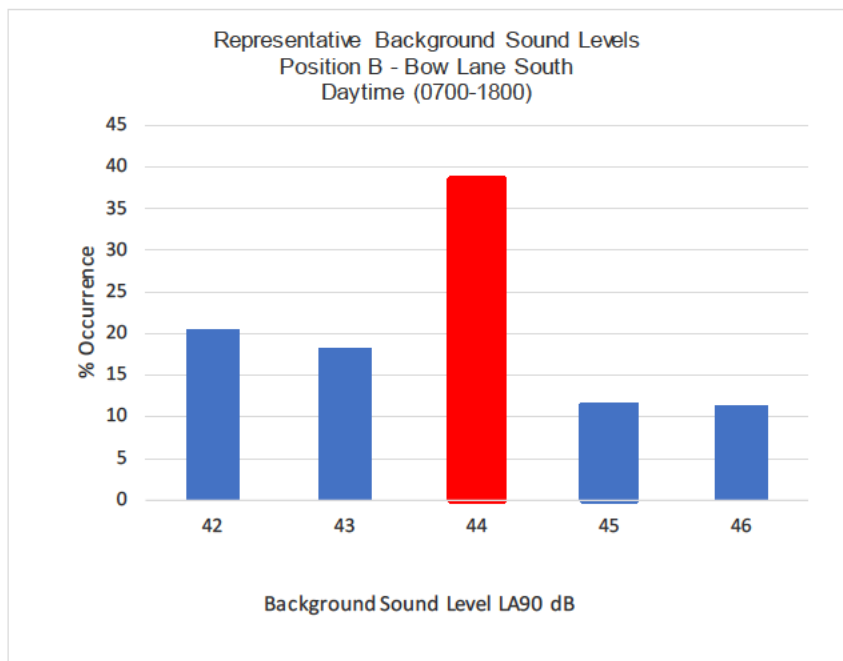
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 12:30 | 15:00 | 48.6 | 49.3 | 43.0 | 67.8 | |
| 12:45 | 15:00 | 51.3 | 54.4 | 42.6 | 74.3 | |
| 13:00 | 15:00 | 48.8 | 47.7 | 43.4 | 72.1 | |
| 13:15 | 15:00 | 50.1 | 51.6 | 42.1 | 72.3 | |
| 13:30 | 15:00 | 48.4 | 50.5 | 43.9 | 65.3 | |
| 13:45 | 15:00 | 49.5 | 48.3 | 42.3 | 70.2 | |
| 14:00 | 15:00 | 52.5 | 52.0 | 43.7 | 74.3 | |
| 14:15 | 15:00 | 45.8 | 46.6 | 42.0 | 66.0 | |
| 14:30 | 15:00 | 50.1 | 49.8 | 41.6 | 67.4 | |
| 14:45 | 15:00 | 48.0 | 47.8 | 42.0 | 67.5 | |
| 15:00 | 15:00 | 49.3 | 49.4 | 42.3 | 69.4 | |
| 15:15 | 15:00 | 48.2 | 48.9 | 43.4 | 65.9 | |
| 15:30 | 15:00 | 48.9 | 47.6 | 43.5 | 71.0 | |
| 15:45 | 15:00 | 49.5 | 50.2 | 43.7 | 73.6 | |
| 16:00 | 15:00 | 52.2 | 52.2 | 43.6 | 72.5 | |
| 16:15 | 15:00 | 53.1 | 53.6 | 44.6 | 74.6 | |
| 16:30 | 15:00 | 53.0 | 54.2 | 45.7 | 75.9 | |
| 16:45 | 15:00 | 53.3 | 55.2 | 45.8 | 72.3 | |
| 17:00 | 15:00 | 53.7 | 55.6 | 45.9 | 73.1 | |
| 17:15 | 15:00 | 52.4 | 54.9 | 45.8 | 70.8 | |
| 17:30 | 15:00 | 53.4 | 55.2 | 44.9 | 69.8 | |
| 17:45 | 15:00 | 53.1 | 56.7 | 45.6 | 72.3 | |
| Log Average 1230-1800 | | 51.1 | 52.4 | 43.9 | 65-76 | |
| Average 1230-1800 | | 50.6 | 51.4 | 43.7 | 65-76 | |
| Average 0700-1800 | | 51.4 | 51.5 | 43.7 | | |



LA90 Representative Levels

| LA90 | % Occurrence |
|-----------|--------------|
| 42 | 20.5 |
| 43 | 18.2 |
| 44 | 38.6 |
| 45 | 11.4 |
| 46 | 11.4 |



Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 5

Client: Moreton C Cullimore

Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position C - Vicinity of Fairfield Bungalow**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 07:00 | 15:00 | 54.0 | 56.4 | 47.1 | 66.5 | |
| 07:15 | 15:00 | 52.2 | 54.6 | 48.2 | 61.2 | |
| 07:30 | 15:00 | 51.3 | 53.6 | 47.6 | 63.5 | |
| 07:45 | 15:00 | 53.4 | 54.9 | 48.2 | 69.8 | |
| 08:00 | 15:00 | 51.9 | 54.4 | 48.0 | 61.1 | |
| 08:15 | 15:00 | 54.0 | 56.9 | 48.7 | 66.4 | |
| 08:30 | 15:00 | 54.0 | 56.3 | 48.1 | 69.8 | |
| 08:45 | 15:00 | 51.7 | 54.0 | 47.4 | 60.7 | |
| 09:00 | 15:00 | 51.8 | 54.3 | 46.8 | 63.4 | |
| 09:15 | 15:00 | 51.2 | 54.0 | 47.2 | 57.8 | |
| 09:30 | 15:00 | 51.3 | 53.3 | 47.9 | 61.4 | |
| 09:45 | 15:00 | 54.0 | 56.7 | 48.6 | 66.0 | |
| 10:00 | 15:00 | 52.3 | 54.6 | 49.1 | 64.5 | |
| 10:15 | 15:00 | 50.8 | 52.6 | 47.7 | 65.7 | |
| 10:30 | 15:00 | 51.2 | 53.5 | 47.1 | 62.5 | |
| 10:45 | 15:00 | 52.0 | 54.2 | 48.2 | 59.8 | |
| 11:00 | 15:00 | 51.9 | 53.8 | 48.1 | 64.5 | |
| 11:15 | 15:00 | 50.3 | 52.5 | 47.0 | 55.8 | |
| 11:30 | 15:00 | 52.2 | 54.7 | 47.8 | 64.4 | |
| 11:45 | 15:00 | 51.4 | 53.2 | 48.0 | 66.0 | |
| 12:00 | 15:00 | 50.6 | 53.0 | 46.9 | 63.0 | |
| 12:15 | 15:00 | 50.9 | 53.2 | 47.3 | 60.3 | |
| Log Average 0700-1230 | | 52.1 | 54.4 | 47.8 | 56-70 | |
| Average 0700-1230 | | 52.0 | 54.3 | 47.8 | 56-70 | |

Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 6

Client: Moreton C Cullimore

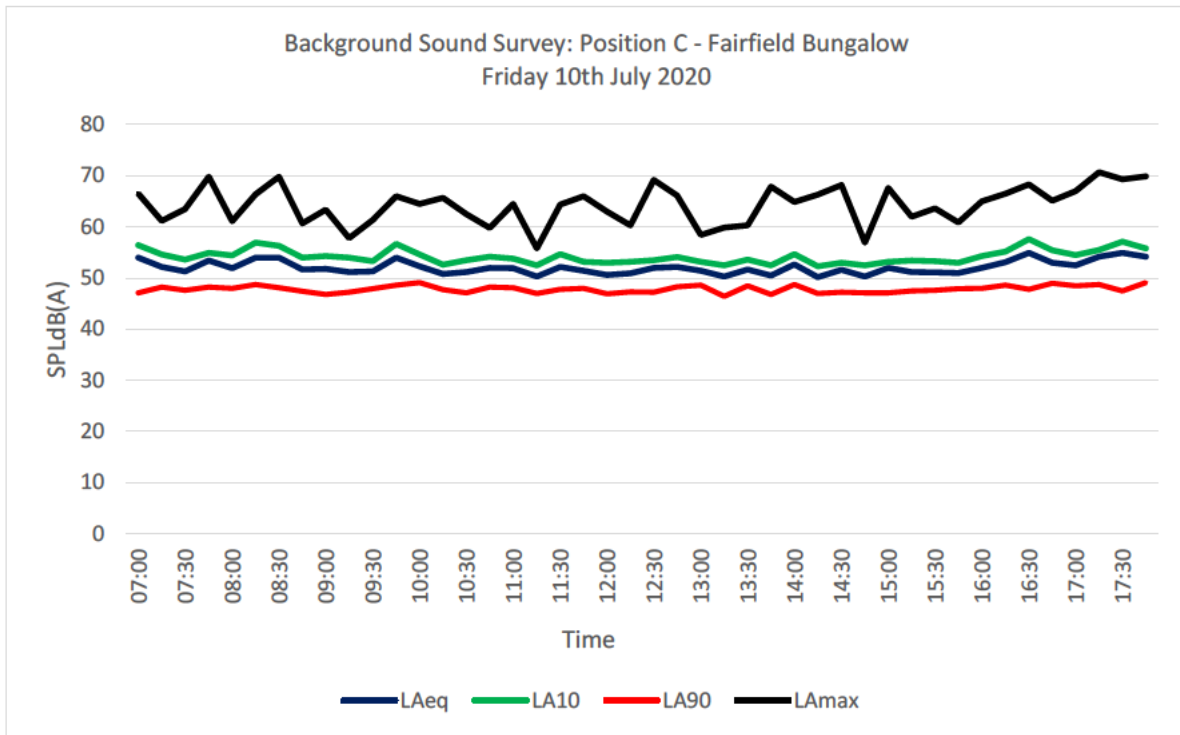
Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position C - Vicinity of Fairfield Bungalow**

Instrumentation: Cirrus 171B Real Time Analyser (G056142)

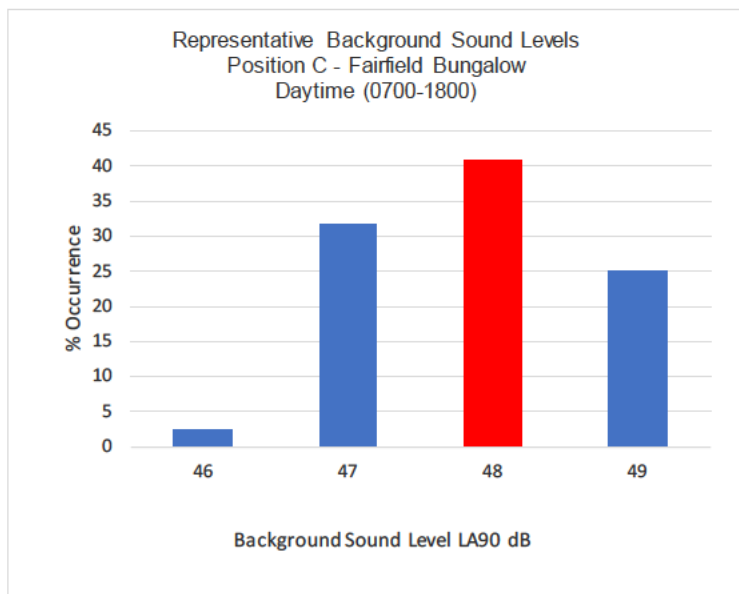
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 12:30 | 15:00 | 52.0 | 53.5 | 47.2 | 69.2 | |
| 12:45 | 15:00 | 52.2 | 54.1 | 48.3 | 66.1 | |
| 13:00 | 15:00 | 51.4 | 53.2 | 48.6 | 58.4 | |
| 13:15 | 15:00 | 50.3 | 52.5 | 46.4 | 59.9 | |
| 13:30 | 15:00 | 51.7 | 53.6 | 48.5 | 60.3 | |
| 13:45 | 15:00 | 50.5 | 52.5 | 46.8 | 67.9 | |
| 14:00 | 15:00 | 52.7 | 54.7 | 48.7 | 64.9 | |
| 14:15 | 15:00 | 50.2 | 52.3 | 47.0 | 66.3 | |
| 14:30 | 15:00 | 51.6 | 53.0 | 47.2 | 68.2 | |
| 14:45 | 15:00 | 50.3 | 52.5 | 47.1 | 56.9 | |
| 15:00 | 15:00 | 52.0 | 53.2 | 47.1 | 67.6 | |
| 15:15 | 15:00 | 51.2 | 53.4 | 47.5 | 62.0 | |
| 15:30 | 15:00 | 51.1 | 53.3 | 47.6 | 63.6 | |
| 15:45 | 15:00 | 51.0 | 53.0 | 47.9 | 60.9 | |
| 16:00 | 15:00 | 52.0 | 54.3 | 48.0 | 65.0 | |
| 16:15 | 15:00 | 53.1 | 55.2 | 48.6 | 66.5 | |
| 16:30 | 15:00 | 54.9 | 57.6 | 47.8 | 68.3 | |
| 16:45 | 15:00 | 53.0 | 55.4 | 49.0 | 65.1 | |
| 17:00 | 15:00 | 52.5 | 54.5 | 48.5 | 67.0 | |
| 17:15 | 15:00 | 54.2 | 55.5 | 48.7 | 70.7 | |
| 17:30 | 15:00 | 54.9 | 57.1 | 47.5 | 69.3 | |
| 17:45 | 15:00 | 54.2 | 55.8 | 49.1 | 69.9 | |
| Log Average 1230-1800 | | 52.3 | 54.3 | 47.9 | 57-71 | |
| Average 1230-1800 | | 52.1 | 54.1 | 47.9 | 57-71 | |
| Average 0700-1800 | | 52.2 | 54.4 | 47.8 | | |



LA90 Representative Levels

| LA90 | % Occurrence |
|-----------|--------------|
| 46 | 2.3 |
| 47 | 31.8 |
| 48 | 40.9 |
| 49 | 25 |



Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 7

Client: Moreton C Cullimore

Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position D - South West (Shuthonger)**

Instrumentation: Cirrus 171A Real Time Analyser (G061253)

Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 07:00 | 15:00 | 49.6 | 51.4 | 46.2 | 62.6 | |
| 07:15 | 15:00 | 51.0 | 52.4 | 47.4 | 65.7 | |
| 07:30 | 15:00 | 50.5 | 52.3 | 47.0 | 63.7 | |
| 07:45 | 15:00 | 49.9 | 51.6 | 46.5 | 64.9 | |
| 08:00 | 15:00 | 50.5 | 52.0 | 47.4 | 68.3 | |
| 08:15 | 15:00 | 50.3 | 51.4 | 46.4 | 71.4 | |
| 08:30 | 15:00 | 49.9 | 52.2 | 46.1 | 66.0 | |
| 08:45 | 15:00 | 49.7 | 51.7 | 45.3 | 65.6 | |
| 09:00 | 15:00 | 49.6 | 51.1 | 46.0 | 67.0 | |
| 09:15 | 15:00 | 51.6 | 53.5 | 46.7 | 70.9 | |
| 09:30 | 15:00 | 50.1 | 51.6 | 46.5 | 66.5 | |
| 09:45 | 15:00 | 51.1 | 53.3 | 45.5 | 64.7 | |
| 10:00 | 15:00 | 49.0 | 50.4 | 45.7 | 61.3 | |
| 10:15 | 15:00 | 49.4 | 51.0 | 46.0 | 64.0 | |
| 10:30 | 15:00 | 49.4 | 51.7 | 45.2 | 58.8 | |
| 10:45 | 15:00 | 50.2 | 51.6 | 47.2 | 65.6 | |
| 11:00 | 15:00 | 50.9 | 52.5 | 46.9 | 69.2 | |
| 11:15 | 15:00 | 49.4 | 51.2 | 46.2 | 61.7 | |
| 11:30 | 15:00 | 51.0 | 51.5 | 46.7 | 68.4 | |
| 11:45 | 15:00 | 50.3 | 51.6 | 47.2 | 65.5 | |
| 12:00 | 15:00 | 49.5 | 50.7 | 44.8 | 66.2 | |
| 12:15 | 15:00 | 50.0 | 52.1 | 43.8 | 62.7 | |
| Log Average 0700-1230 | | 50.1 | 51.8 | 46.2 | 59-71 | |
| Average 0700-1230 | | 50.1 | 51.8 | 46.2 | 59-71 | |

Noise Survey Results

Date: Friday 10th July 2020

Location: Bow Farm, Twyning, Gloucestershire

TABLE 8

Client: Moreton C Cullimore

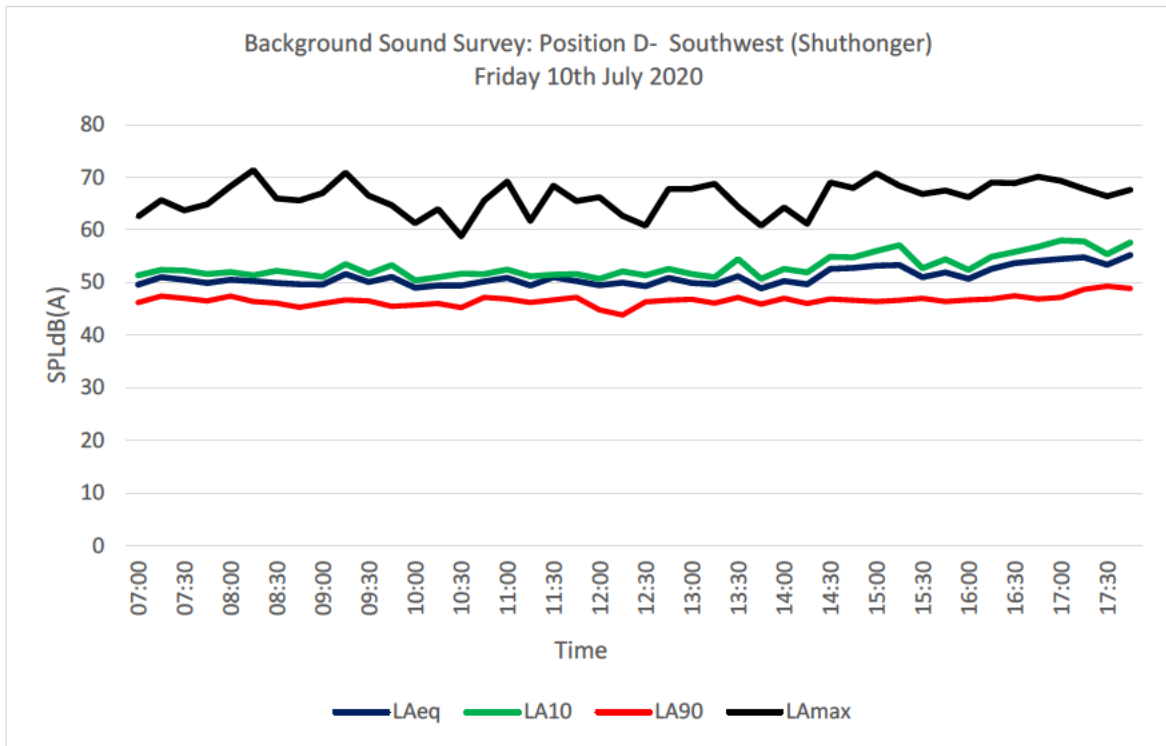
Project: Sand & Gravel Quarry

Data: **Baseline Sound Survey: Position D - South West (Shuthonger)**

Instrumentation: Cirrus 171A Real Time Analyser (G061253)

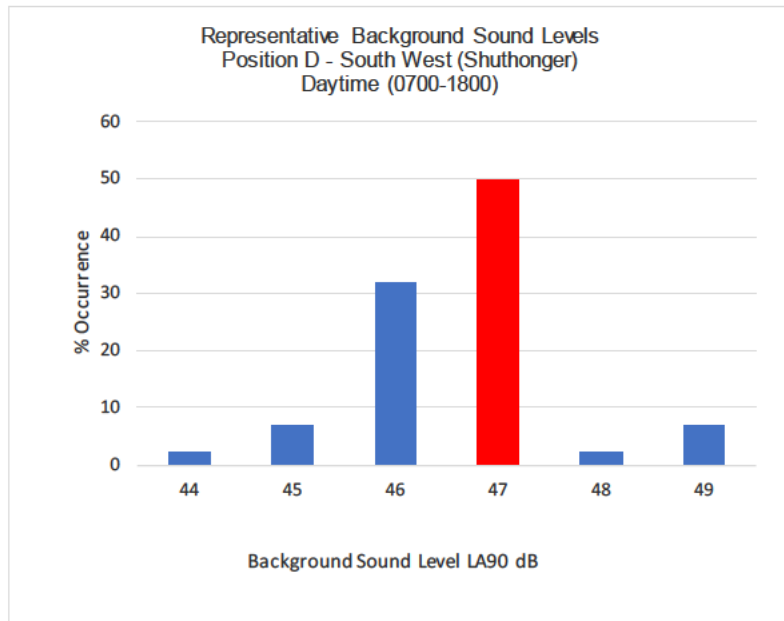
Calibration: 94dB

| Start Time | Run Time (mins.) | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Observations |
|-----------------------|------------------|-----------|-----------|-----------|-----------|--------------|
| 12:30 | 15:00 | 49.3 | 51.4 | 46.3 | 60.8 | |
| 12:45 | 15:00 | 50.9 | 52.6 | 46.6 | 67.8 | |
| 13:00 | 15:00 | 49.9 | 51.6 | 46.8 | 67.8 | |
| 13:15 | 15:00 | 49.7 | 51.0 | 46.1 | 68.8 | |
| 13:30 | 15:00 | 51.2 | 54.5 | 47.2 | 64.4 | |
| 13:45 | 15:00 | 48.9 | 50.7 | 45.9 | 60.8 | |
| 14:00 | 15:00 | 50.3 | 52.6 | 47.0 | 64.3 | |
| 14:15 | 15:00 | 49.7 | 51.9 | 46.0 | 61.2 | |
| 14:30 | 15:00 | 52.6 | 54.9 | 46.9 | 69.0 | |
| 14:45 | 15:00 | 52.8 | 54.8 | 46.6 | 68.0 | |
| 15:00 | 15:00 | 53.2 | 56.0 | 46.4 | 70.8 | |
| 15:15 | 15:00 | 53.3 | 57.1 | 46.6 | 68.4 | |
| 15:30 | 15:00 | 51.0 | 52.7 | 47.0 | 66.8 | |
| 15:45 | 15:00 | 51.9 | 54.4 | 46.4 | 67.5 | |
| 16:00 | 15:00 | 50.7 | 52.4 | 46.7 | 66.2 | |
| 16:15 | 15:00 | 52.6 | 54.9 | 46.9 | 69.0 | |
| 16:30 | 15:00 | 53.7 | 55.8 | 47.5 | 68.9 | |
| 16:45 | 15:00 | 54.1 | 56.8 | 46.9 | 70.1 | |
| 17:00 | 15:00 | 54.5 | 58.0 | 47.2 | 69.3 | |
| 17:15 | 15:00 | 54.8 | 57.8 | 48.7 | 67.8 | |
| 17:30 | 15:00 | 53.4 | 55.4 | 49.3 | 66.4 | |
| 17:45 | 15:00 | 55.2 | 57.6 | 48.9 | 67.6 | |
| Log Average 1230-1800 | | 52.3 | 54.9 | 47.0 | 61-71 | |
| Average 1230-1800 | | 52.0 | 54.3 | 47.0 | 61-71 | |



LA90 Representative Levels

| LA90 | % Occurrence |
|-----------|--------------|
| 44 | 2.3 |
| 45 | 6.8 |
| 46 | 31.8 |
| 47 | 50 |
| 48 | 2.3 |
| 49 | 6.8 |



Noise Survey Results

Date: Friday 10th July 2020
Location: Bow Farm, Twyning, Gloucestershire
Client: Moreton C Cullimore
Project: Sand & Gravel Quarry
Data: **Baseline Sound Survey: Spot Roaming Measurements**
Instrumentation: Norsonic 118 Real Time Analyser (31992)
Calibration: 94dB

TABLE 9

| Start Time | LAeq (dB) | LA10 (dB) | LA90 (dB) | LAmx (dB) | Location |
|----------------|-------------|-------------|-------------|--------------|---------------------|
| 11:25 | 47.7 | 49.4 | 45.2 | 56.3 | H) Hotel Car Park |
| 11:40 | 46.5 | 47.6 | 44.4 | 63.1 | H) Hotel Car Park |
| 11:55 | 46.2 | 46.4 | 42.2 | 59.8 | H) Hotel Car Park |
| Average | 46.8 | 47.9 | 44.1 | 56-63 | |
| 12:20 | 51.4 | 50.2 | 42.4 | 64.1 | G) Puckrup Lane |
| 12:35 | 59.7 | 49.4 | 42.5 | 81.8 | G) Puckrup Lane |
| 12:50 | 52.9 | 54.4 | 43.3 | 88.6 | G) Puckrup Lane |
| Average | 56.2 | 51.9 | 42.7 | 64-89 | |
| 13:15 | 47.8 | 48.6 | 44.6 | 71.4 | I) Bow Lane |
| 13:30 | 46.5 | 48.7 | 44.5 | 65.3 | I) Bow Lane |
| 13:45 | 47.6 | 49.2 | 45.7 | 62.5 | I) Bow Lane |
| Average | 47.3 | 48.8 | 44.9 | 63-71 | |
| 14:11 | 50.6 | 52.8 | 44.9 | 68.8 | A) Bow Lane |
| 14:26 | 54.1 | 57.3 | 48.0 | 62.8 | A) Bow Lane |
| 14:41 | 57.6 | 59.2 | 46.9 | 83.8 | A) Bow Lane |
| Average | 54.9 | 57.1 | 46.7 | 63-84 | |
| 15:10 | 53.6 | 46.8 | 46.8 | 54.1 | E) South (Redpools) |
| 15:25 | 54.4 | 48.8 | 47.6 | 59.8 | E) South (Redpools) |
| 15:40 | 53.4 | 55.0 | 46.9 | 58.9 | E) South (Redpools) |
| Average | 53.8 | 51.6 | 47.1 | 54-60 | |
| 16:08 | 57.2 | 60.3 | 47.2 | 73.0 | F) East (A38) |
| 16:23 | 58.2 | 61.0 | 48.3 | 79.2 | F) East (A38) |
| 16:38 | 59.2 | 61.5 | 46.6 | 86.3 | F) East (A38) |
| Average | 58.2 | 60.9 | 47.4 | 73-86 | |

NVC/12

NOISE MANAGEMENT PLAN

Noise Management Plan

Construction Noise:

In accordance with BS5228-1:2009+A1:2014, 'best practical means' would be employed to control the noise generation.

Operating Hours

Proposed operating hours are as follows:

Monday to Friday: 0700 to 1800 hours

Saturday: 0700 to 1300 hours

Example of measures adopted to control noise based on best practicable means would include:

- Construction of proposed site boundary screening earth mounds behind closest residential properties at start of works (as indicated in Appendix NVC/2).
- Sensible routing of the construction plant to avoid the nearest residential properties.
- All construction plant and equipment will comply with EU noise emission limits.
- Plant will be serviced regularly to minimise adverse noise impacts.
- All vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers and maintained in good efficient working order.
- Selection of inherently quiet plant where appropriate. All ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Machines in intermittent use will be shut down in the intervening periods between work or throttled down to a minimum.
- Materials will be handled with care and be placed, not dropped into skips or lorries.
- Materials will be delivered during normal working hours.
- All mobile plant fitted with 'white noise' reversing alarms (i.e. no tonal 'beeper' type reversing alarms).
- Keeping HGV tailgates (as appropriate) closed to avoid 'body slapping'.
- Use of rubber linings on chutes and material transfer points (as practicable).
- All ancillary plant such as generators, compressors and pumps will be positioned so as to cause minimum noise disturbance, i.e. furthest practicable position from receptors and where practicable behind close boarded noise barriers or fitted with acoustic enclosures.
- Community Relations – this is one of the most important aspects of mitigation as providing the local residents with clear information of the activities that would be taking place and the length of time that any peak noise levels may occur will assist in allaying people's fears. BS5228 states *"It is suggested that good relations can be developed by keeping people informed of progress and by treating complaints fairly and expeditiously. The person, company or organisation carrying out the work on site should appoint a responsible person to liaise with the public."*
- Placing haul roads as far as practicable from nearest sensitive receptor locations.
- Implementation of site rules related to considerate mineral working practices such as avoiding unnecessary revving of engines and switching off equipment when not required.
Use of broadband type reverse alarms for mobile plant (i.e. avoiding tonal 'beeper' type alarms).
- Use of a one-way system/turning circles and/or use of a banksman to avoid/reduce the need for reverse alarms.
- Consideration of phasing noisy works to less sensitive times of day (i.e. first thing in the morning).

Construction Vibration:

Best practice would be followed during the mineral workings in accordance with BS5228-2:2009+A1:2014. Typical methods used to control vibration could include, for example:

- Provision of cut-off trenches (if high levels of vibration expected at residential receptors)
- Maximum separation distance of site plant from residential receptors to minimise vibration
- Community relations to inform residents of peak activities
- Monitoring of vibration where vibratory plant is being used within 30m to 40m of residential property boundaries.

Complaints Procedure

1. Should any member of the public have any issues with noise or vibration from the Site, they should contact the Site (Tel: XXXXXXXX) and provide details of the complaint giving the nature of the noise, details of their name and address, how often it occurs, what time of day and day of the week and where it was heard.
2. Complaints would be managed in accordance with the complaint procedure outlined below. Complaints received should be logged in the appropriate form and then investigated accordingly.
3. Where appropriate, the Environmental Manager and/or project Community Liaison Manager undertake an investigation of the complaint. They decide upon the appropriate course of action and any corrective actions to be undertaken in response to this investigation.
4. In the event complaint of noise or vibration, the following investigations would be undertaken:
 - Notification of the complaint and actions taken are provided to the local authority. Actions to be taken as soon as possible by M.C. Cullimore (Gravels) Ltd or their representative.
 - Note the time, date, identity and contact details of complainant. Note if the complaint has been referred from the local planning authority ask complainant to describe the noise and vibration emission; is it constant or intermittent, how long has it been going on for, is it worse at any time of day, does it come from an identifiable source.
 - Undertake a site inspection as soon as possible after receipt of a complaint. Note all noise and vibration producing activities taking place and the noise and vibration mitigation methods that are being employed. If the complaint was related to an event in the recent past, if possible, note any noise and vibration producing activities that were underway at that time and implement any remedial action necessary.
 - As soon as possible visit the area from where the complaint originated to ascertain if noise and vibration is still a problem.
 - If a source of noise and vibration other than the construction work is causing the noise and vibration nuisance verify the source. Photograph the source and emissions.
 - As soon as possible after the initial investigations have been completed contact the complainant to explain any problems found and remedial actions taken.

- If necessary update any relevant method statements to prevent any recurrence of problems.
- File the noise and vibration complaint form on the complaint register.
- Notify the appropriate project Management personnel and local authority as soon as practicable that a complaint has been received and what the findings of the investigation were and any remedial measures taken.
- Inform workers on site of complaint and what the findings of the investigation were and any remedial measures taken.